Information

ON THE USE OF THE

WETZEL GRID

A technique for evaluating

PHYSICAL FITNESS

in terms of

GROWTH AND DEVELOPMENT

Abstracted and Prepared by
The DIVISION *of* CHILD *and* MATERNAL HEALTH
AND
The DIVISION *of* PHYSICAL FITNESS

DEPARTMENT *of* NATIONAL HEALTH *and* WELFARE
OTTAWA

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GOOD GROWTH

IS

THE BASIS

OF

PHYSICAL FITNESS

IN

CHILDREN

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Dr. Norman C. Wetzel, author of the Grid Technique, acted in an advisory capacity in the preparation of this pamphlet. Acknowledgment is given to him also for permission to quote extensively from his various publications.

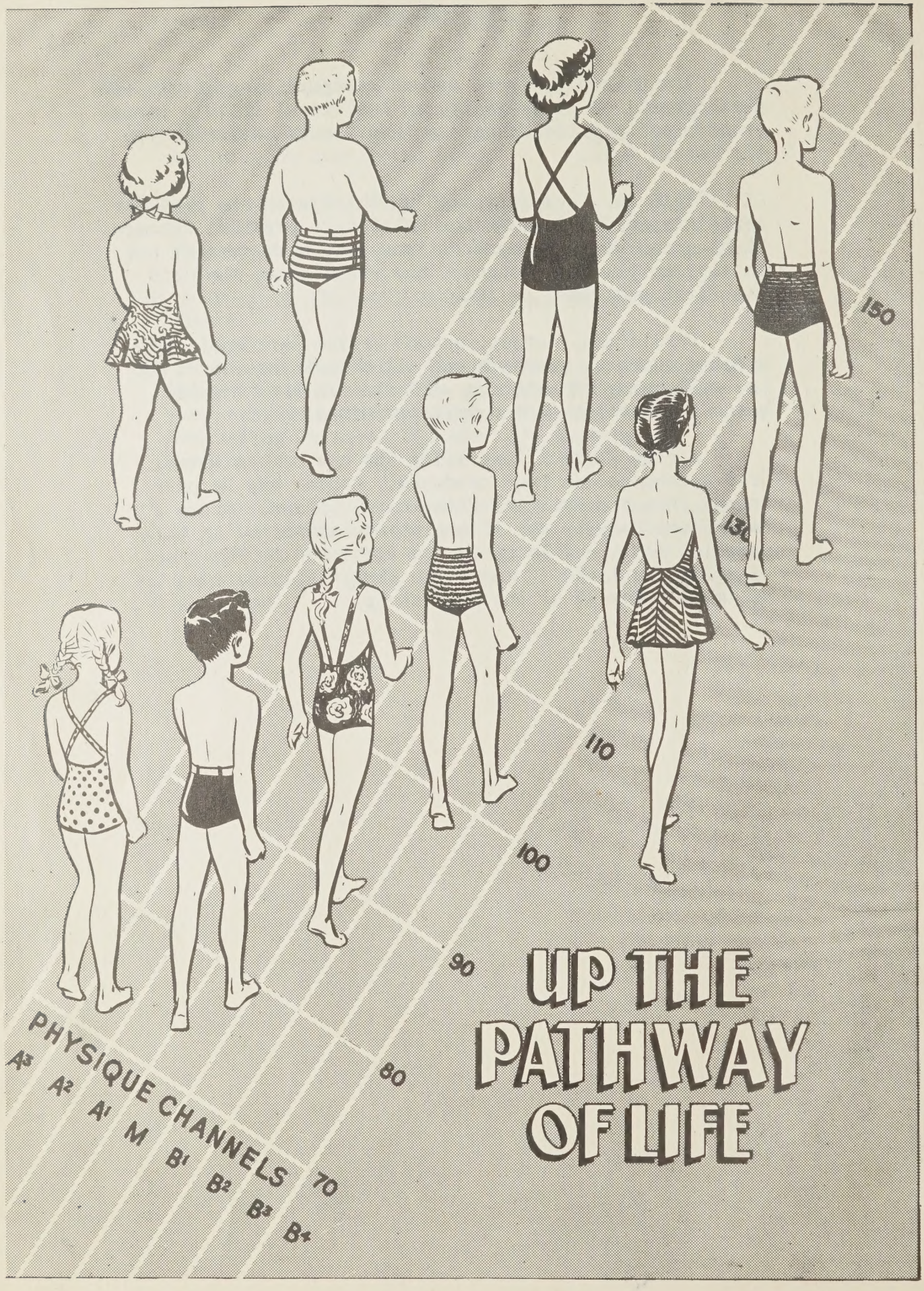
FOREWORD

The demand for some method of appraising growth and development, or of assessing an individual child's normal or abnormal physical progress, has focused attention on the Wetzel Grid.

This is a graphic chart which objectively portrays certain specific features as related to physical fitness. Studies and survey demonstrations have been carried out in various places throughout the world since the Grid was first published in 1940.

Physicians, nurses, school health personnel, physical educators, teachers and all others interested in the well-being of children will find in this booklet basic information on the Grid technique.

A film strip illustrating the use of the Wetzel Grid technique has been produced. Copies may be purchased from the National Film Board, Ottawa. Cross references between the illustrations contained in this pamphlet and the film strip are indicated by FS. For example, Fig.15-FS.17 indicates that Fig.15 is identical with Frame 17 of the film strip.


150
110
100
90
80
70
PHYSIQUE CHANNELS
A3 A2 A1 M B1 B2 B3 B4
UP THE PATHWAY OF LIFE

THE NEED FOR MEASUREMENT

The need for a simple, economical but accurate means of assessing the child's state of well-being, or physical fitness, has been apparent for years. The following criteria have been used as guides in assessing the practical value and sound procedure of such techniques as have been suggested from time to time:

1. Measurements should be limited to those which can be made routinely at school, at home, or in a doctor's office.

2. Basic data should be usable without calculation.

3. Very little extra time or labour should be involved.

4. The process should be intelligible to the average person.

5. Methods used should be free from bias traceable to subject, examiner, or circumstances of examination.

6. Results obtained should be referrable to a standard in order that significant deviations from health may be accurately measured.

7. Results should be expressed in numerical or graphical terms.

* * * * * * * * * * *

THE WETZEL GRID TECHNIQUE

The Wetzel Grid is a three-colour chart which consists of a set of calibrated standards by which physical status, the direction, and the speed of growth may be separately distinguished and measured from routine data on height, weight and age.

Physical Status represents the present condition of the individual reflected by both weight and height.

Growth can be interpreted in two ways from the chart: (1) the direction, and (2) the speed of growth.

Physique refers to the type of body build. Nine channels indicate the varieties of physique, ranging from channel A_4, through M to B_4. Only one body type is encountered in each channel, irrespective of the stage of development.

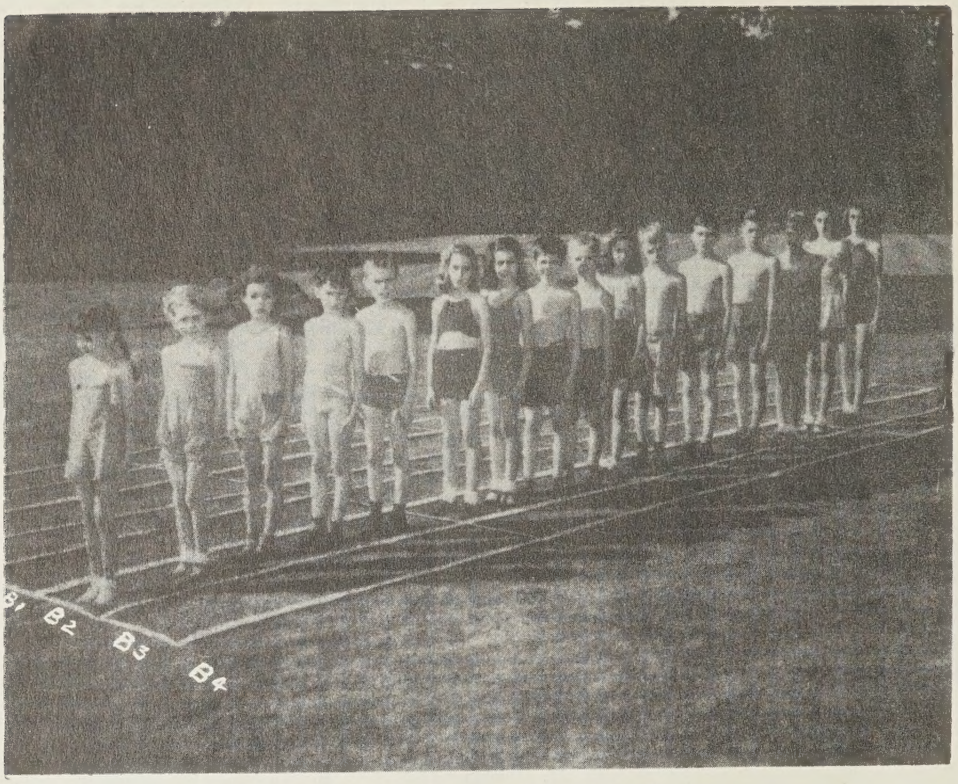


Fig.2-FS.5

This is the body type which most often corresponds with that considered to be fair physical condition.

These children represent one body build type - B_2 - and range in development from level 36 to level 109.

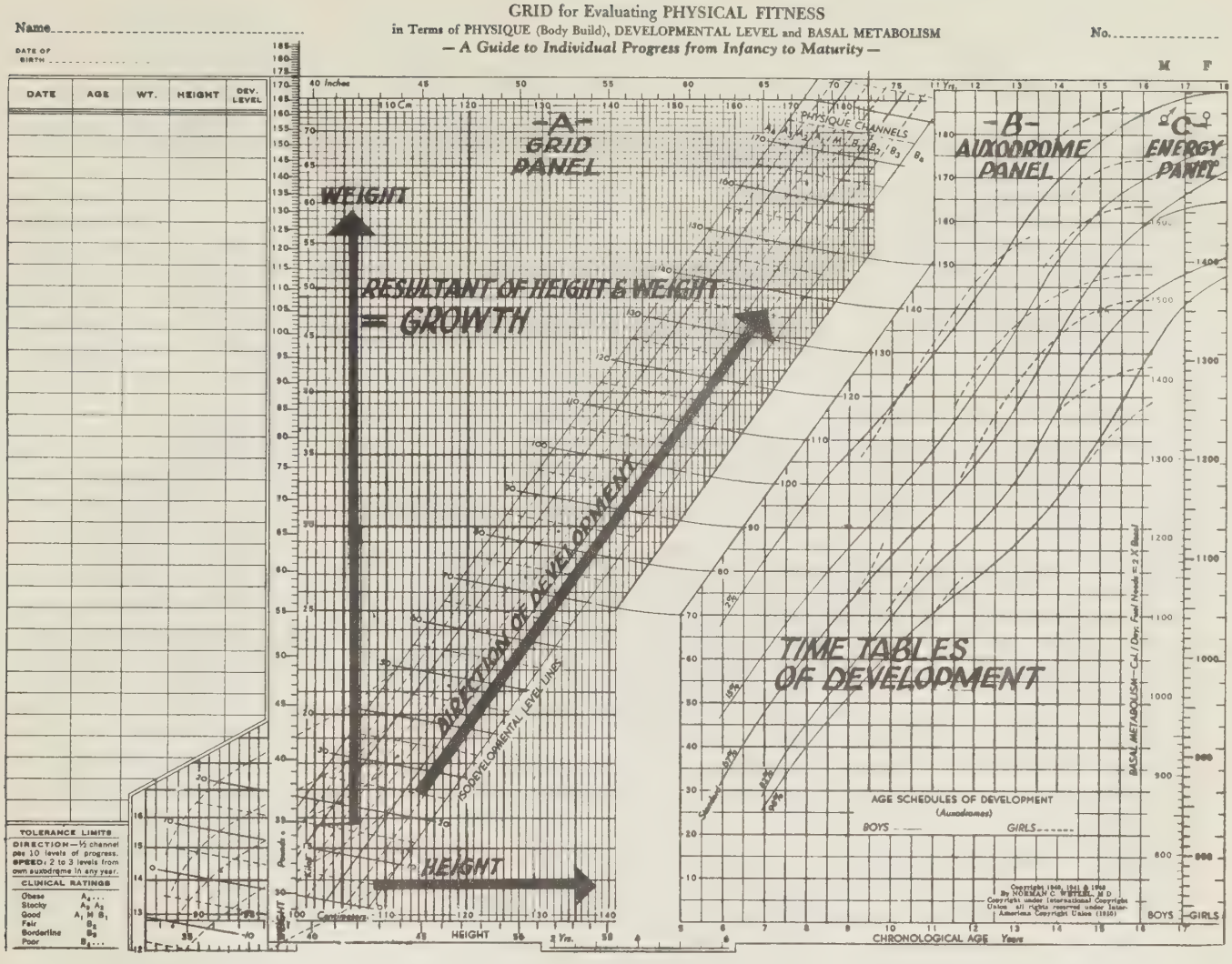


Fig.3-FS.6

Growth - For Grid purposes there are two forms: (a) growth in weight and (b) growth in height. The former is measured along the vertical weight scale, the latter along the horizontal height scale, in panel A of figure above.

Development - The resultant of growth in weight and growth in height measured in "levels" read off from the diagonal scale of the channel system. Normal development proceeds at approximately one level per month.

Physique - Body build or type. Nine principal varieties of physique are classified by channels extending from A_4 through M to B_4. See Page 4.

Developmental Age - This may be determined simply by reading the age at which the 67% norm crosses a given developmental level.

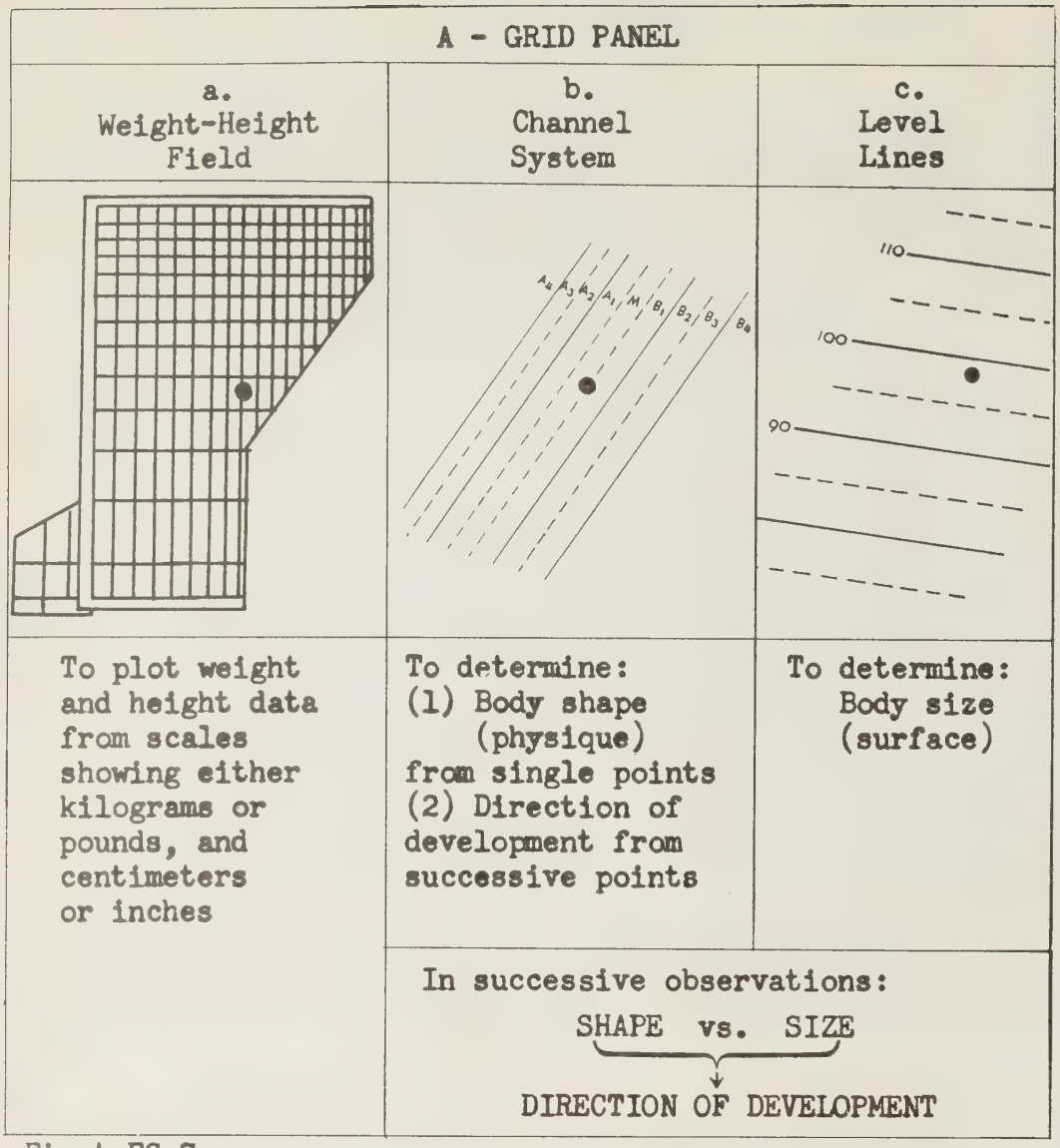


Fig.4-FS.7

The GRID consists of three interconnected panels -

A-The Grid Panel
B-The Auxodrome Panel
C-The Energy Panel

Single Observations -

A single point in the channel system represents body shape and size. When a child's weight is plotted against his height as in "a", the point is located in or near the channel system "b" at some developmental level "c".

Body Shape -

The channel system provides for the identification of nine types of body build or physique, with the more obese and stocky types at the left in the channels A_4, A_3; the medium in the A_1, M, B_1; and the slender types in B_2, B_3, B_4.

Body Size -

The level at which a height-weight point is located measures a child's body size or body surface. Children on the same level line all have the same surface or skin area, even though their shapes differ and their observation points are located in different channels.

Speed of Development

Gains in growth are measured in terms of levels attained and of age, in order to determine whether or not the speed of development is satisfactory. A healthy child's speed of development is approximately one level line per month. Although all children are not expected to reach the same level at the same age, it is helpful to know to what extent they approximate the growth speeds of children generally.

The auxodrome recording indicates the speed of the child's growth regardless of which line his record follows. The most important factor is consistency.

The quality of growth depends not so much on a child's actual shape and size, as such, but rather on what that child is doing with the size and shape he happens to possess. Thus, successive observation points which indicate the direction and the speed of development are much more valuable than a single observation.

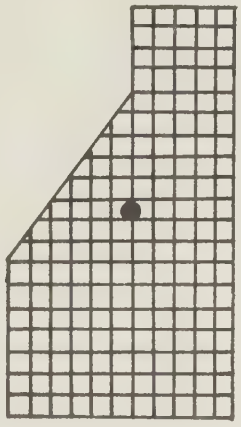
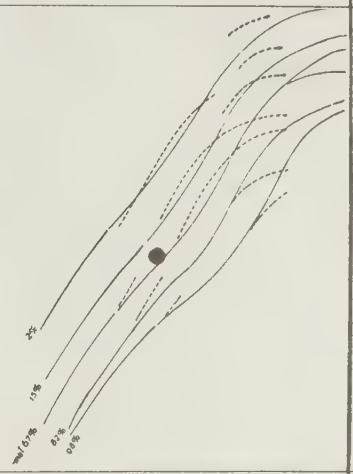
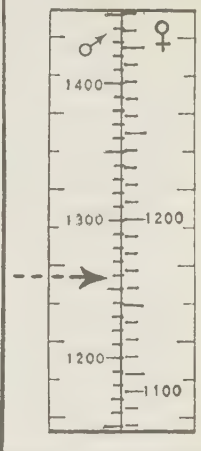
B - AUXODROME PANEL		C - ENERGY PANEL
d.	e.	f.
Level-Age Field	Standard Schedules of Development (Auxodromes)	Levels Aligned to Energy Scales
		
A "distance-time" chart - to show level reached at a given age.	Normal pattern of level advance with age Blue: Schedules for boys Red: Schedules for girls Black: Common schedules	Scales give basal heat production in cal./day. Fuel requirements = 2 x basal values
But, SIZE vs. AGE → SPEED OF DEVELOPMENT		

Fig.5-FS.8

Some children are generally recognized as being more highly advanced than others of the same age. This means that they have reached higher levels in progressing along the channel system. Such children will be proceeding according to schedules ahead of the 67% auxodrome. Those whose curves fall below the 67% standard of reference may be developing satisfactorily, if progress is consistent.

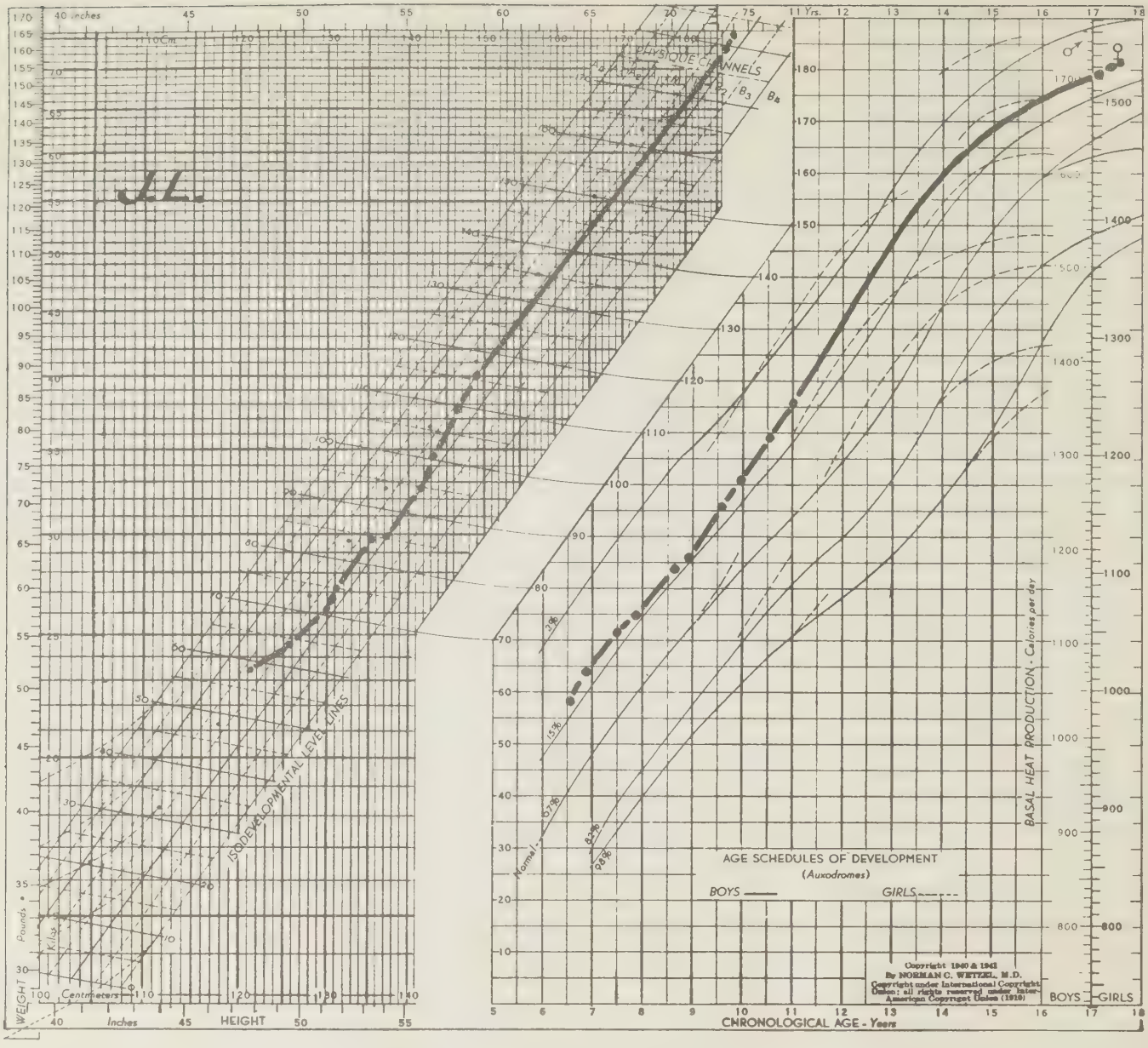


Fig.6-FS.9

J.L.'s Grid record shows a series of plottings between 6 years 6 months and 17 years 7 months. This is <u>almost</u> top quality growth. During the span of 11 years 1 month, there is reasonable adherence to physique type or body shape. The speed of development follows with fidelity the male auxodrome.

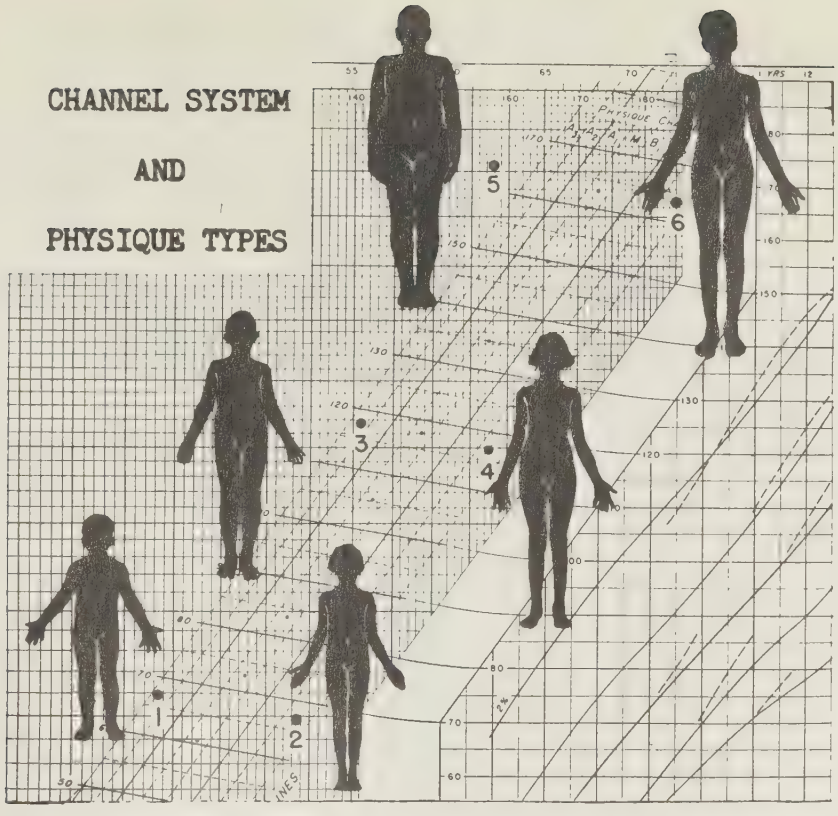


Fig.7-FS.10

Here we see examples of the growth of two body types at three different levels of development. The stockiness of the one and the slenderness of the other become increasingly apparent as size increases.

Under normal conditions a child's channel can be determined at the sixth or seventh year. Healthy progress is indicated by progress along a channel of given body type, on an age schedule or time table of progress specific for the individual and with the preservation of that subject's natural physique.

The significant and important characteristic of body build, rate of development, and age schedule (auxodrome) is that in health these factors remain constant during the prolonged ten to twelve year period of school life during which children grow to adult size. (See case J.L., page 10.)

Thus evaluation of growth for the purpose of assessing the physical condition of children depends on noting whether changes have occurred in those components which should normally remain constant.

WHAT DOES THIS TABLE PORTRAY?

Can you reconstruct a mental image of this child? Can you appraise his physical status accurately from information given in the tabulation below.

HEIGHTS AND WEIGHTS OF CASE (initials) T.B.

Age in Years and Months	Weight in lbs.	Height in inches
7-0	48	46½
7-7	51¼	47¼
8-0	54¼	48¼
9-6	62¼	51
10-9	67¼	52½
11-3	70¾	54½
12-3	76½	56
12-6	77	56¾

* * * * * * * * * *

1. What type of build has he?
2. Does he show satisfactory progress or not?
3. What is his present nutritional condition?
4. What activity program is indicated?
5. What types of activity should he be encouraged to pursue in the light of his body build or of his progress?
6. What level of achievement in physical activity is considered excellent, good, average, sub-standard for this particular child?

A tabular record of weight and height does not help much in the attempt to reconstruct a mental image of precisely what has gone on before. This is so because the real significance of these data is not revealed until they are translated into terms such as channel (body build), level (size), and auxodrome (speed).

(Ref:) "Assessing the Physical Condition of Children"
Norman C. Wetzel, M.D.; Journal of Pediatrics,
St. Louis, Vol.22, No.1, pp.82-110, Jan.,1943.

DOES THIS CLARIFY THE PICTURE?

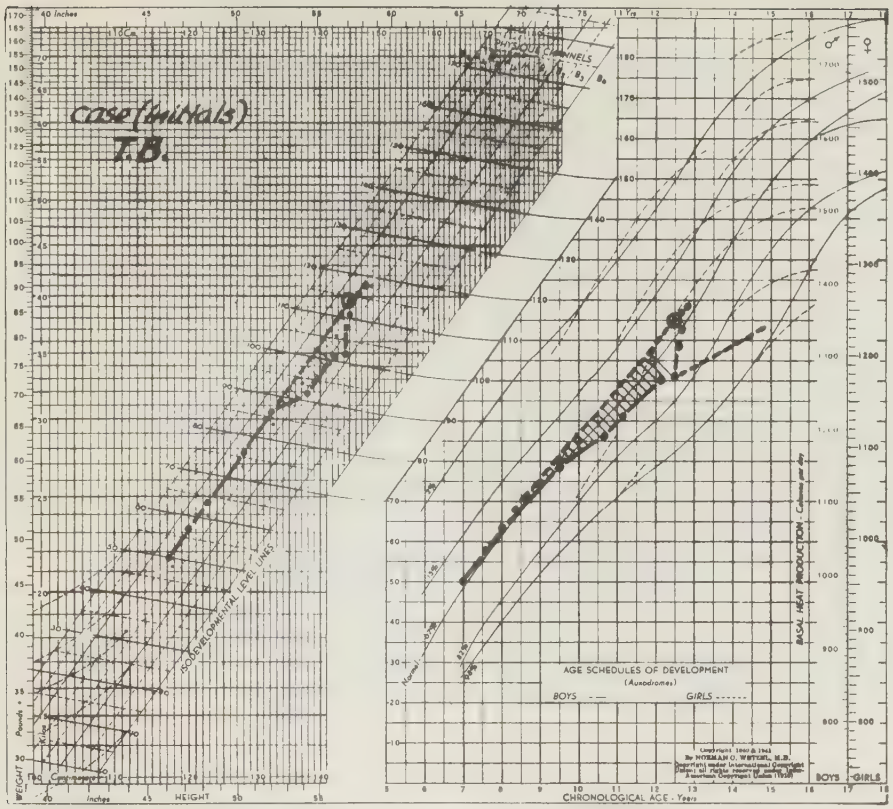


Fig.8-FS.11

THE GRID RECORD OF CASE (initials) T.B.

The solid lines indicate the actual record. The broken line indicates the course of development the child should have taken on the basis of the first observations.

Interpretation of the Grid Record - Evaluation as of 12½ years.

I. Physical Status - Still "good", but rapidly approaching "fair" (B_2).
   a. Physique - Loss of 1⅛ channels.
   b. Development - 31.5 per cent. "off" by failure to achieve more than 24 of 35 expected levels in the last three years.
   c. Nutritional Gradient - Departs 13½° off channel course which is eleven times the standard deviation (1.2°) of the direction of "healthy" curves that proceed channel-wise.

II. Physical Progress
   a. Channel Course - Up channel from level 50 to 87
      Cross channel from level 87 to level 113.
   b. Auxodromic Progress - Satisfactory from seven to 9½ years
      Unsatisfactory from 9½ to 12½ years
      Retardation of 0.9 to 1.0 year behind his own schedule.

Ref: "Assessing the Physical Condition of Children"
Norman C. Wetzel, M.D.; Journal of Pediatrics,
St. Louis, Vol.22, No.1, pp.82-110, Jan.,1943.

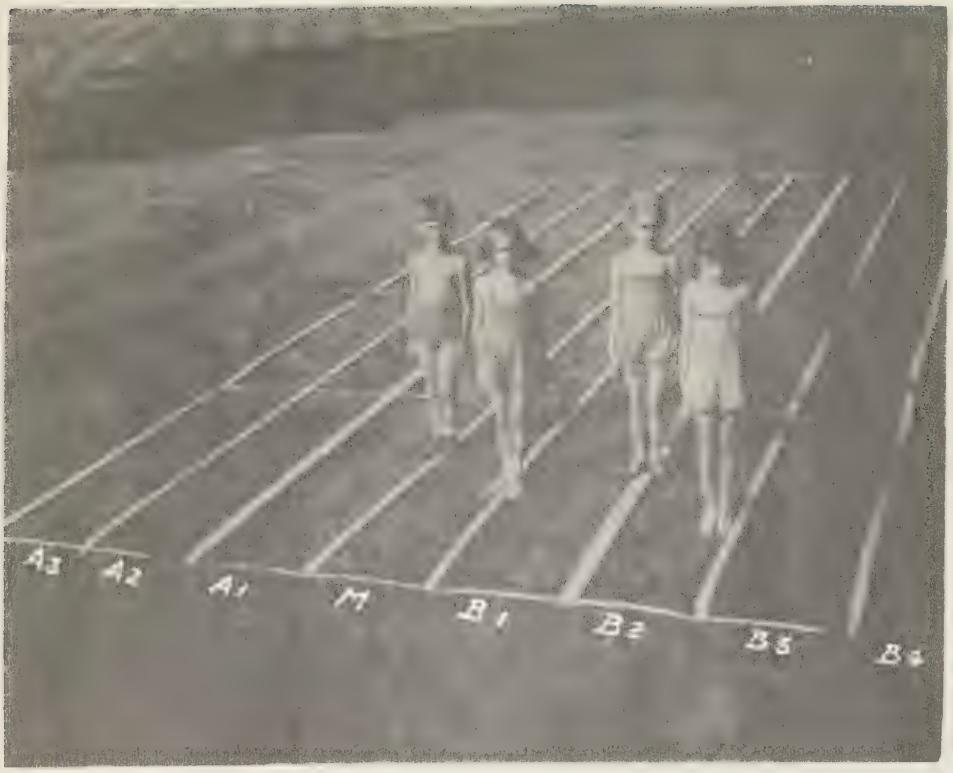


Fig.9-FS.12

The above illustration shows children grouped according to their physical measurements on a reproduction of a small section of the Grid. Lines running from left to right indicate levels of development. Those extending from the foreground toward the back of the picture identify the channels which represent the different types of body build.

Fig.10-FS.13

This illustration shows a greater variation as to both level and channel. Children whose Grid position differs by several channels show clearly the differences in body build.

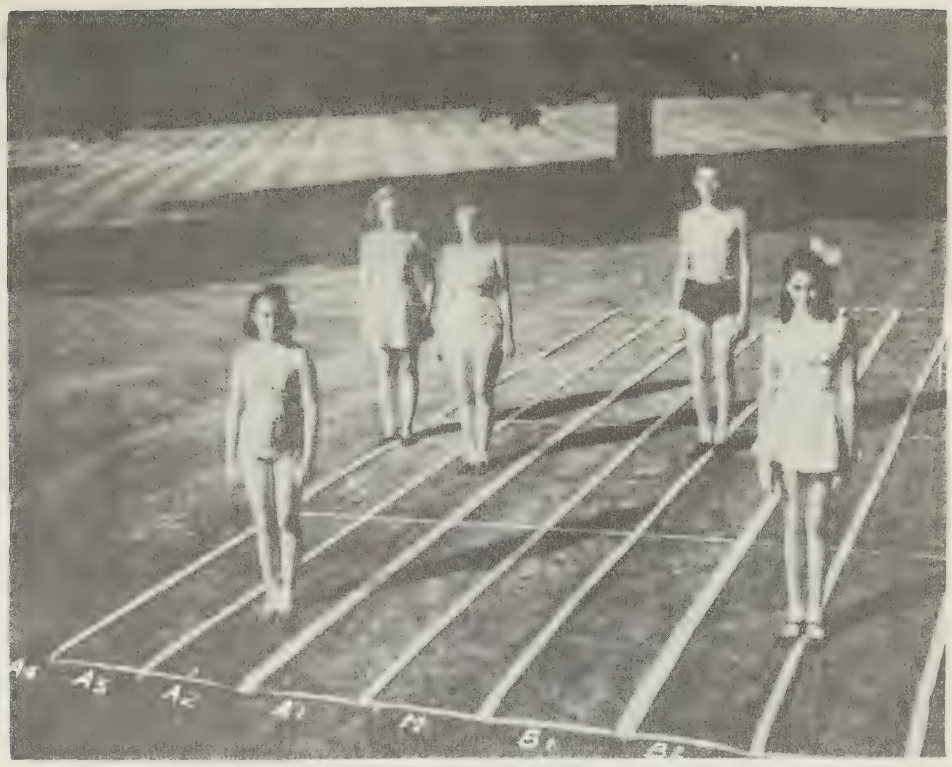


Fig.11-FS.14

Differences in body build are more easily noted at the higher levels.

Fig.12-FS.15

Differences in body build and body size within three levels are not as apparent. These children range from level 76 to 79.

MEASURING AND RECORDING

Consistency of procedure is essential for subsequent study and analysis.

Measuring Height for Uniformity.

It is better to use a tape measure, flat against the wall, if necessary cutting into the baseboard and starting at "0" zero.

A triangular piece of wood one inch thick and eight inches long marks an accurate height level on the tape when placed squarely against the wall, touching the top of the head of a child standing with heels, buttocks and shoulders against the wall - without shoes, feet flat on the floor. For accuracy, it is necessary that measurements be taken while the child stands as tall as possible (body fully extended).

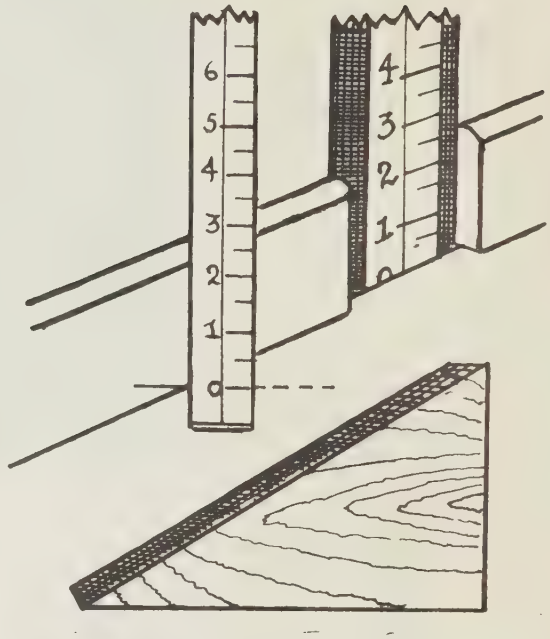


Fig.13-FS.16

Measurement of Weight. A tested and balanced scale of either the beam or spring variety is acceptable. Heavy clothing should be removed (shoes, jackets, sweaters). If children wear unusually heavy clothing, arrange to measure them on a day when ordinary clothing is worn.

Recording of Height and Weight should be made to the closest half unit (pounds and inches, or kilograms and centimetres) unless finer measurements are desired.

For example, record

97¾" as 98"	97⅞ lbs. as 98 lbs.
97¼" as 97½"	97¼ lbs. as 97½ lbs.

Calculation of Age in years and months. Calculate the age in years and months - for example, 10 years 4 months is recorded as 10-4. An excess of 15 days from the birth date is recorded as an additional month; for example, birth January 3rd - recording on June 20th would be 7 months. (The use of a "ruler-calculator" saves considerable time.)

Keeping a GRID RECORD is quite a simple matter, provided that careful observation is followed by accurate recording.

Name LOUIS F.

DATE OF BIRTH 2/18/32

DATE	AGE	WT.	HEIGHT	DEV. LEVEL
12/23/43	11.84	53	52½	64
11/29/37	5.75	42	43½	35½
6/4/42	8.30	52	48½	59
11/4/42	10.70	56½	51½	69
3/3/43	11.10	55¾	52	68
1/1/44	11.86	25.5	133.0	70
1/30/44	11.94	27.5	133.6	77
2/18/44	12.00	29.5	134.0	83½
3/12/44	12.10	32.2	134.6	92
5/22/44	12.25	34.3	136.4	98
7/19/44	12.40	36.2	139.9	104
10/20/44	12.67	88	56½	114
11/18/44	12.73	92½	57½	119
5/20/45	13.25	99¼	59	127
9/15/45	13.58	103	59⅜	132

TOLERANCE LIMITS

DIRECTION—½ channel per 10 levels of progress.
SPEED: 2 to 3 levels from own auxodrome in any year.

CLINICAL RATINGS

Obese	A_4...
Stocky	A_3 A_2
Good	A_1 M B_1
Fair	B_2
Borderline	B_3
Poor	B_4...

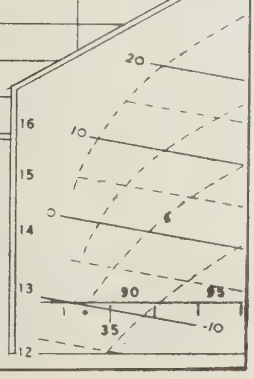


Fig.14

STEP I.

A. Record the child's name in full.
B. Record the birth date indicating the day, the month and the year. For example: the eighteenth of June, 1947, is recorded 18/6/47.
C. Enter the date of observation (recording day, month and year), age on that date, and weight and height measurements in the ruled table at the left of the Grid.
D. Plot weight from the vertical and height from the horizontal scale, using red scale marks for data in pounds and inches or blue rulings for kilograms and centimetres.
E. Read developmental level from the black diagonal scale and insert this value in column five of the table at the left side of the Grid.
F. Plot developmental level against corresponding age in panel B to locate the position of the child's auxodrome (ref. page 9).
G. Use dots for all recordings plotted on both the channel and the auxodrome. Circle the observation made at the time of classification on the Grid. Sketch in expected auxodrome with dashes. Sketch in red area fuel debt by cross patching where the actual auxodrome line runs below the expected auxodrome. Sketch in blue all accelerations by cross patching where the actual auxodrome runs above the expected auxodrome.
H. Repeat steps "C" to "G" for each observation and draw the curve segments, leaving white space on either side of points (see figure page 10).

Note: Sample Grid "Louis F" shows some heights and weights recorded in inches and pounds and others in the metric system, indicating that both methods can be used.

Due to frequent follow-ups in the recovery program, the ages are calculated in years and decimals of a year. Omitting such frequent rechecks, ages are calculated in years and to the closest month (ref. page 16).

SUGGESTIONS FOR CLASSIFICATION AND FILING

Classify - A-Satisfactory
B-Unsatisfactory
(a) A_4's and above for obesity
(b) B_2's for follow-up; B_3's and below
(c) Red area laggers
(d) Blue area accelerations
(e) All irregularities

Filing - Satisfactory - These records are filed in a filing box which is a half inch wider than the width of the grids. They are filed in an upright position.

Unsatisfactory - These grids are "ticked" with a red pencil check mark after the word "metabolism" at the top of the grid and are filed in the opposite direction, thereby giving greater height, hence prominence, because these are the grids that demand immediate attention. When an unsatisfactory case is ultimately screened as satisfactory, the red check mark is circled with the blue pencil and the grid is filed in the less prominent position along with the satisfactory. Cases demanding special attention are tabbed with a signal marker. For example, the signal designations used in the British Columbia survey were: Red tabs - referred to doctor; Blue tabs - nutritional; Black tabs - emotional tension; Orange tabs - urgent attention.

Supplies - Permanent Black Ink; Ink Remover; Medium Nib; Blue and Red Pencil; Transparent Xylonite Triangles No.1855, 8"; Non-Slip Steel Ruler, No.18, 18" (cut in half for proper usage); Ruler-Calculator.

Program Planning for Unsatisfactory Groups - (Method followed in the British Columbia study)

i. Physical Examination by Medical Doctor
ii. Parent Conference on (1) Grid Findings
(2) Physical Examination Findings
(3) Resulting Situations
(4) Indicated Action
(5) Agreement or Non-agreement to co-operate.
iii. Follow-up - This means first, recent weight and height data plotted for progress because there is no use attempting to appraise a youngster whose grid record is not up the minute.
iv. Reappointments - The more serious the condition the more frequent should be the rechecks, e.g., every two weeks - less severe cases may be seen at four, six, or eight week intervals. Marked psychological benefits accrue from actually showing the child, the parent and the attending physician the progress as objectively visualized from the Grid.

STEP II.

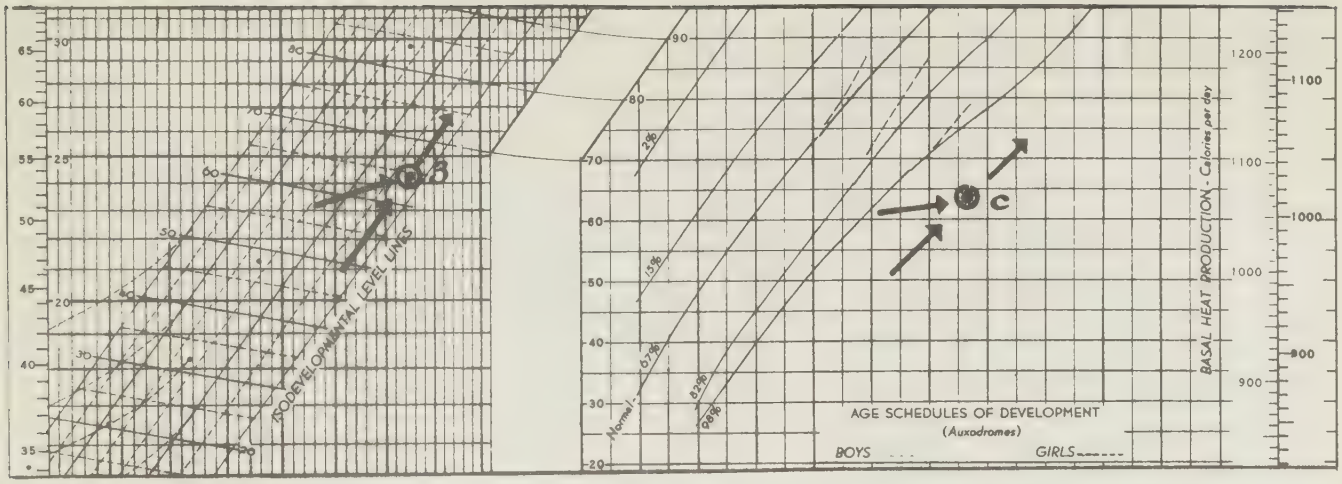


Fig.15-FS.17

The first plotting shows the child's physical status but gives no indication of the direction or speed of his development. A second observation made after an interval of three months increases the value of the original information.

To assist in the interpretation of a single point, Wetzel points out that:

1. In general, children whose "first" points plot in the central channels or in A_2 or A_3 are seldom enough off par to warrant concern.
2. Children in B_2 should be regarded with some reserve since they may or may not represent passable physical status. This should be confirmed by direct physical examination.
3. Those in B_3 will usually be on the borderline of being frankly "poor" - a state they definitely reach in B_4.
4. Auxodrome recordings falling between the 15% and the 67% standards cause no concern as long as development is proceeding at normal rate. Points outside these limits, especially those behind the 67% auxodrome should serve to identify a child as in need of close follow-up.

STEP III.

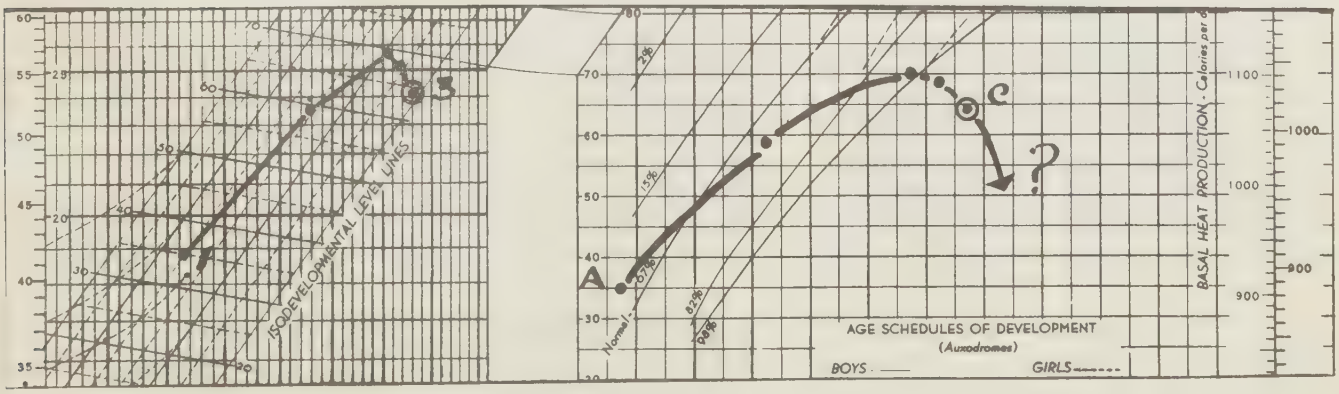


Fig.16-FS.18

Measurements of height and weight made prior to a "first" observation such as in Fig.15 should also be plotted on the Grid. The resulting curve helps one to visualize the child's growth in retrospect and provides a basis for interpreting the significance of single points or of the pattern as a whole.

STEP IV.

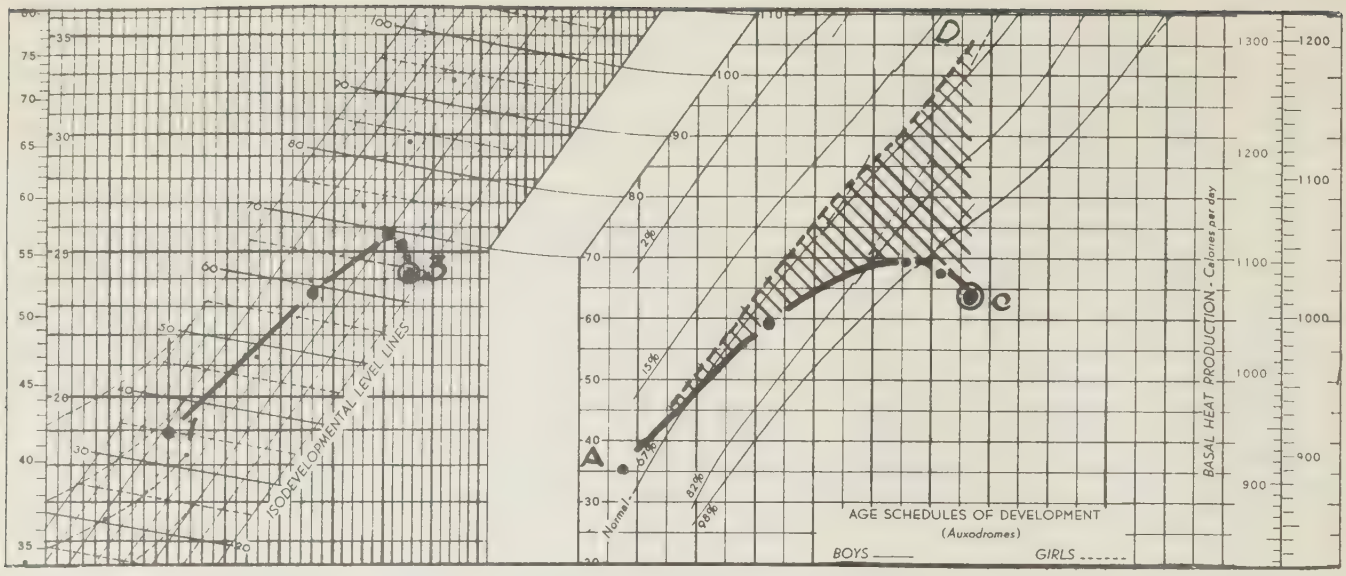


Fig.17-FS.19

It is possible to project a child's normally expected course of development in the channel system, panel A, as well as in panel B. For this, one uses the earliest observation available, and one is guided by the principle that healthy progress is up-channel and parallel with some nearby auxodrome (see dashed projection A to D in figure above.)

STEP V.

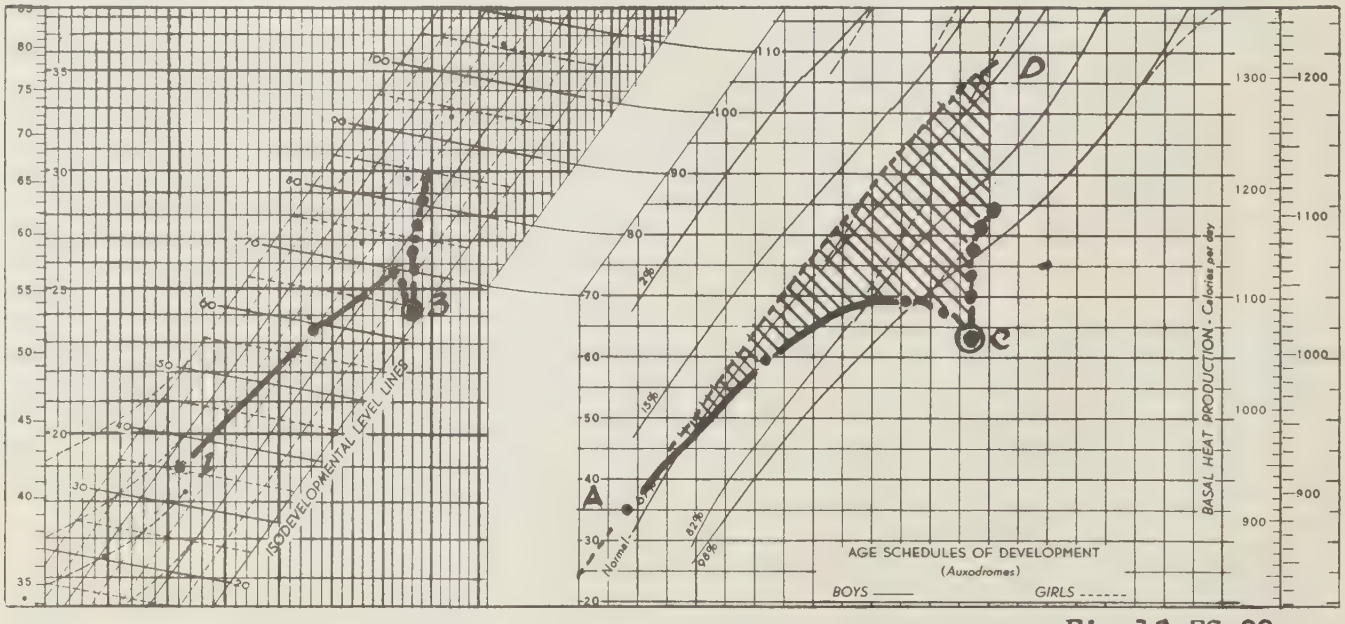


Fig.18-FS.20

Following institution of a planned Recovery Program, restoration to expected channel and schedule has begun, as shown in the above figure. It should be noted that while losses tend to be gradual and to take a comparatively long time, recovery follows rather more rapidly; that is, at about 3-5 levels per month.

STEP VI.

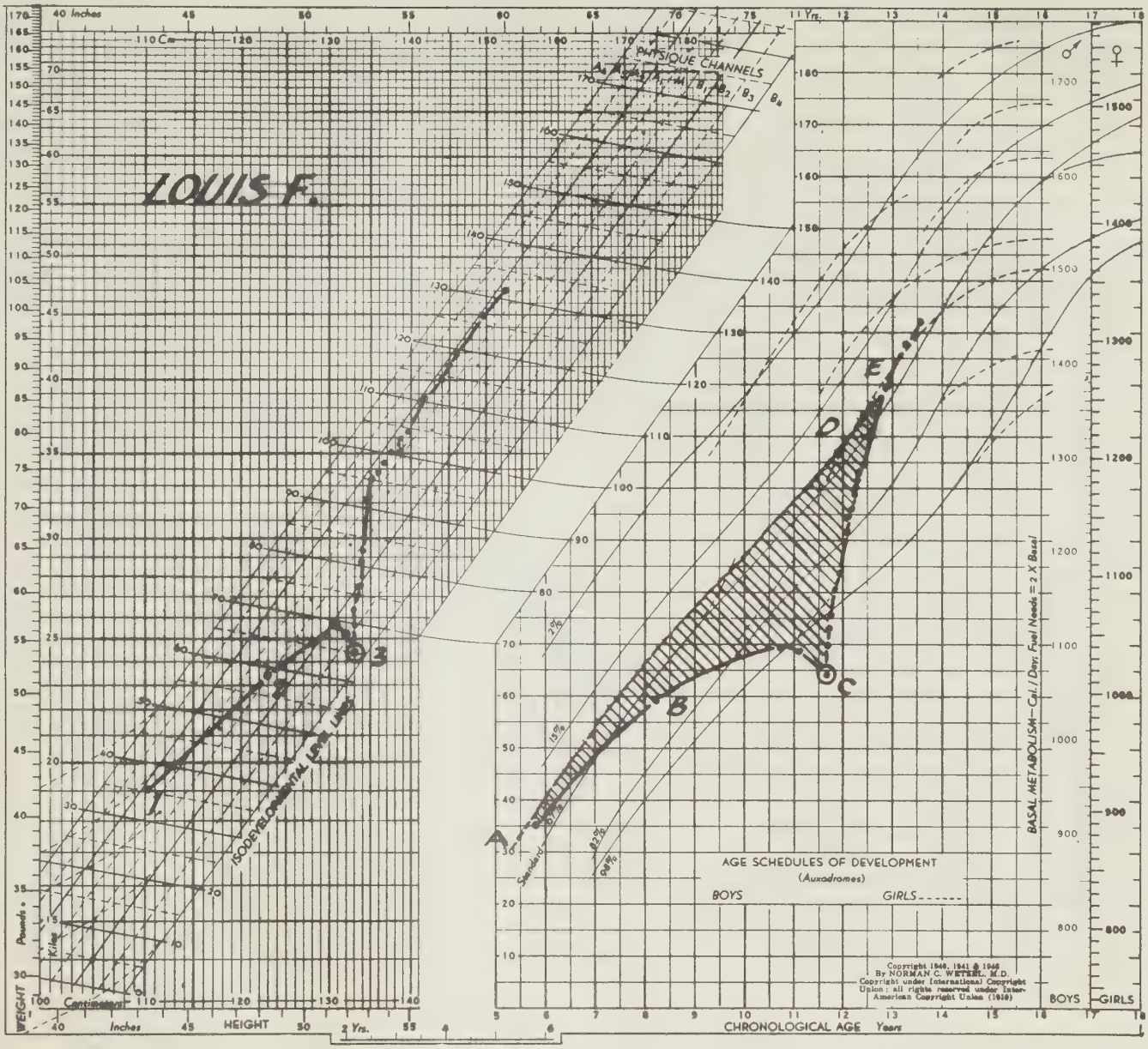


Fig.19-FS.21

Recovery has now been fully completed. Channel and schedule have been re-established and stabilized. This series of step-by-step changes during onset of and recovery from growth failure were observed in the case of a diabetic boy, discovered to be such at point C. Many other causes could lead to similar trends and results.

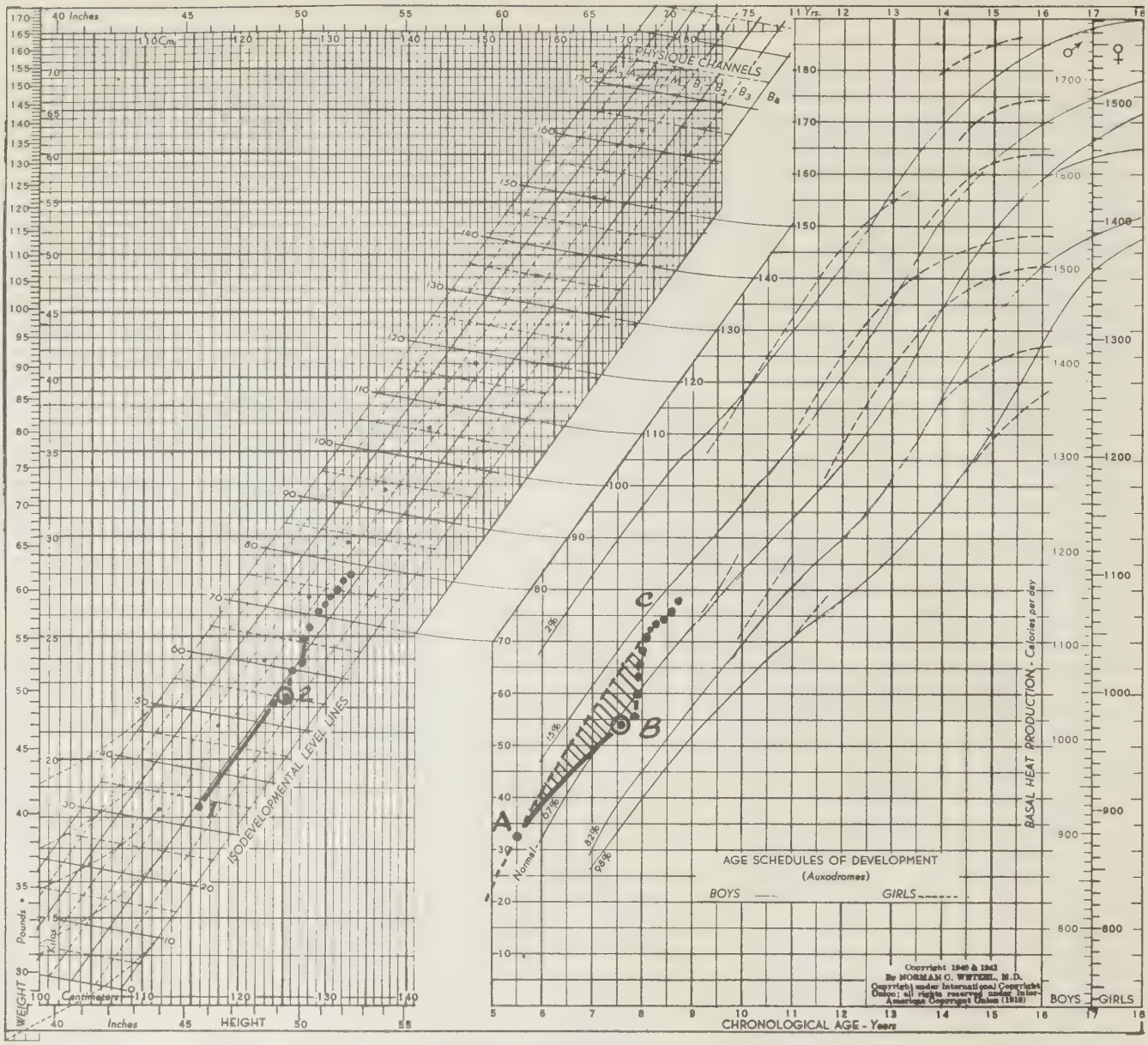


Fig.20-FS.22

The above Grid record illustrates growth failure which occurred during the period represented by (1 to 2) and (A to B). Upon examination of the later recordings, it appears that points 1 and A did not quite represent the child's optimum physique and level at age five years and six months.

Attention is drawn to the fact that, although growth failure had been in process for a period of more than two years, recovery was accomplished in four and one half months, owing to favourable circumstances. In addition, it should be noted that, after full recovery, normal progress was consistent in speed at the rate of one level per month and in direction, directly up-channel. It would seem that the child is now following his basic pattern of growth since recovery was established under conditions of clinical control.

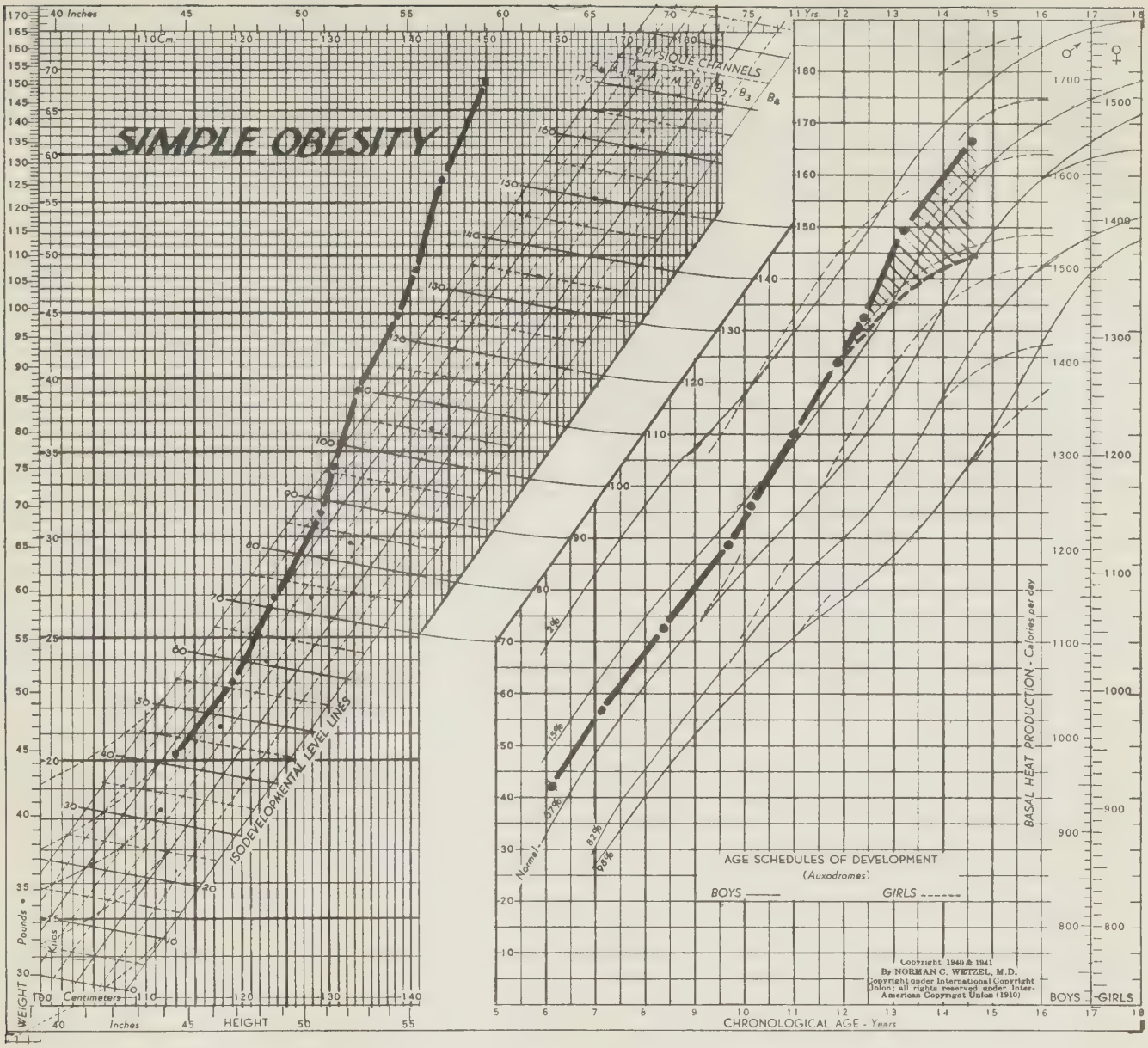


Fig.21-FS.23

J.R.W. shows progressive tendency to simple obesity. Physical examination is negative except for "stoutness". This girl admits over-indulgence in food, particularly sweets, cakes and "pop". Although dietary reorganization, proper exercise and careful observance of "Grid Progress" was the solution in this instance, two points should be further emphasized: (a) with the help of Grid follow-up such tendencies to obesity can be detected long before they become as extreme as this record indicates, and (b) laboratory examinations such as basal metabolism, X-ray of Sella Turcica and epiphyses, or other tests should be considered.

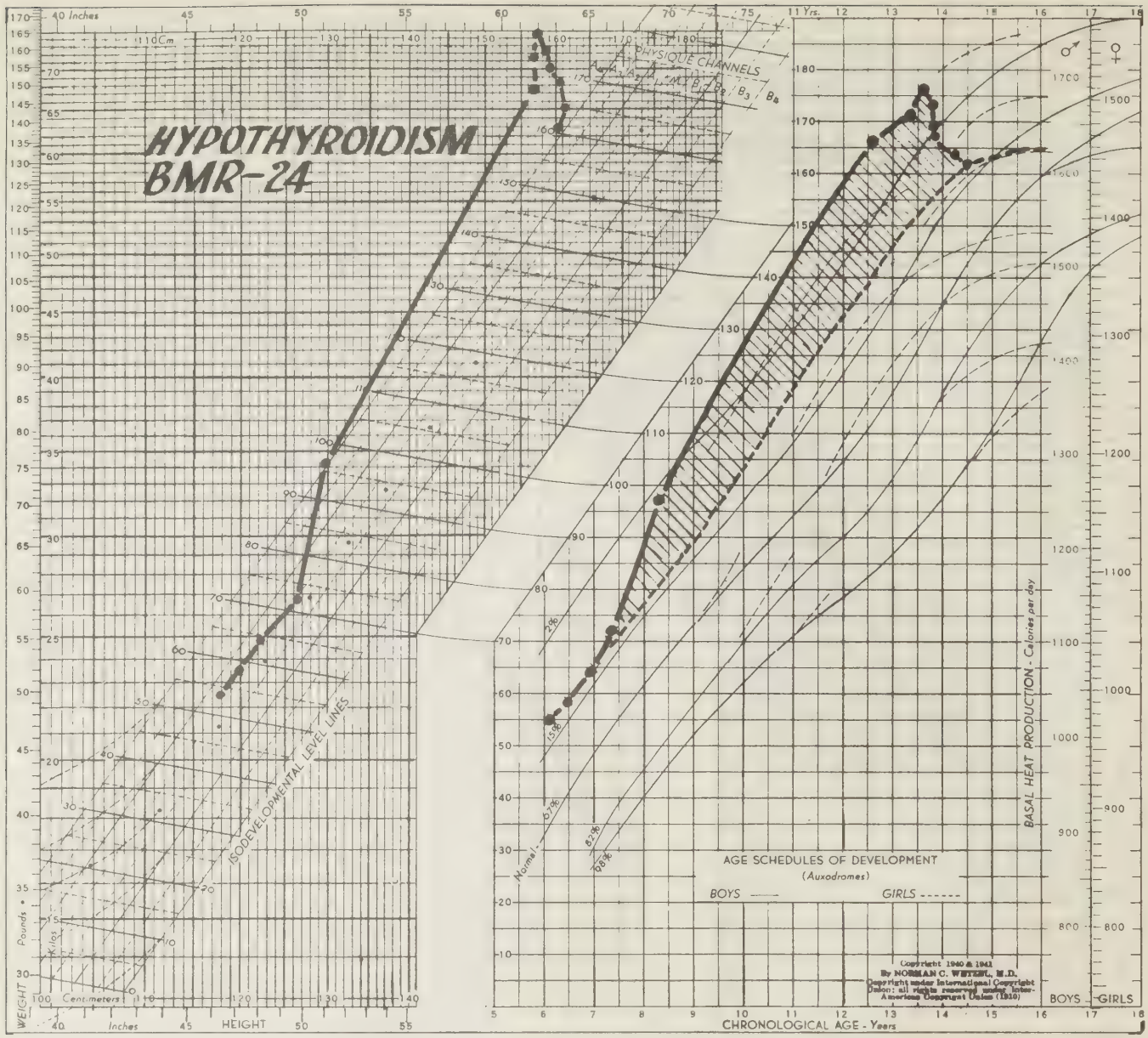


Fig.22-FS.24

C.E.B. shows change of physique to ultimate obesity. This girl was physically and mentally sluggish, dry hair and skin, low blood pressure and had a palpable thyroid. Her B.M.R. was Minus 24. Her Grid record shows favourable responses to therapy.

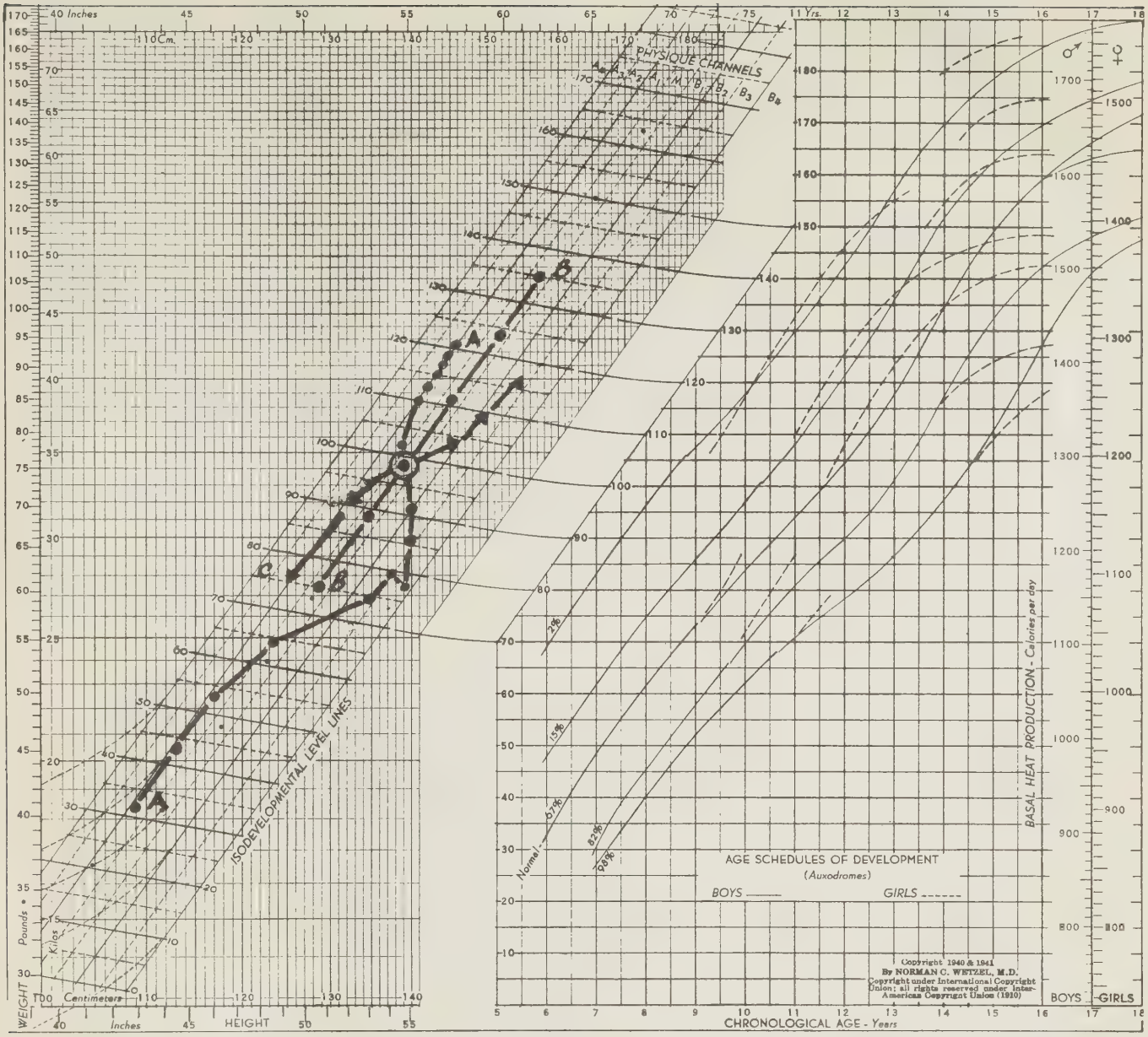


Fig.23-FS.25

INTERPRETATION OF GRID RECORDINGS

Three children, A, B, and C, have exactly the same heights and weights, namely, 54¾ inches and 75 pounds. All are passing through a common point, M-98, on the Grid. To interpret the recording, two additional facts are needed:

1. How did they approach the common point?
2. In what direction were they moving?

When earlier observations were added, it became evident that -

A had experienced growth failure and was rapidly regaining physique;
B was progressing up-channel normally;
C was losing physique and was on the way toward obvious growth failure.

Thus, while all three children were moving through a common point, they represented three entirely different growth patterns. Physical status depends not only upon position but upon direction as well.

The "GRID RATING" of any child has particular significance for physical education teachers. The information it provides assists in determining:

1. The appropriate number and length of participation periods.
2. The types of activity which offer reasonable assurance of better than average performance.
3. The type of competition which will be beneficial and the extent to which it should be undertaken.
4. The individual's selection of recreational activities.

The basis of good health in children is a set of conditions that enable the child to grow and develop to his own full capacity. As a consequence, one of the best positive signs of good overall health is a demonstration of good overall growth.

Children whose growth is below par are unable to make full use of their educational opportunities. Early detection of retardation in growth followed by recovery from growth failure will eliminate considerable wastage.

This diagram shows the per centage of boys and girls usually found in various channels or in groups of channels. The 4,045 children whose records were included in the chart had been observed over a period of from six to 12 years.

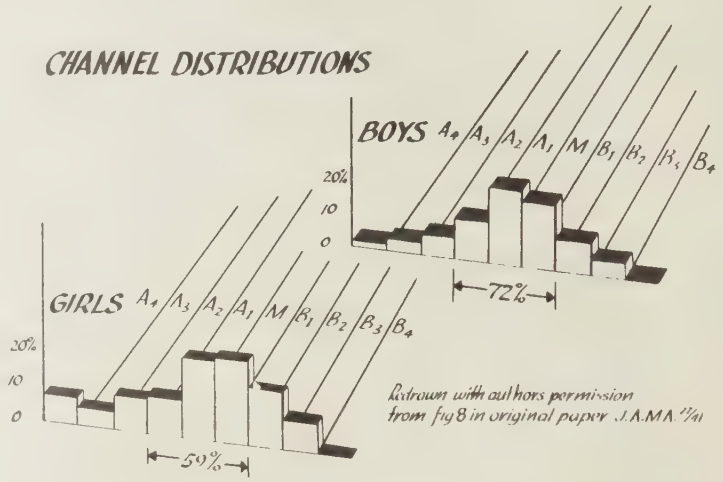


Fig.24-FS.26

DEVELOPMENTAL AGE

The understanding and acceptance of the concepts of "mental age" and "intelligence quotient" contributed significantly to a better interpretation of mental ability.

It is now possible to evaluate physical growth on a comparable basis. Developmental age and physical status attained can be measured objectively and accurately. These contribute basic information to any evaluation of the "whole child", whether for the purpose of a medical examination, the determination of the number of courses of study to be elected or the selection of recreational sports and games. The doctor, the parent, the teacher, the nurse, the guidance counsellor, the physical education teacher and the child himself can readily understand the pictorialized record in a Grid, and by so doing can appreciate the need for recommended procedures. In addition, it assists the average person to understand and provides a common point of reference for all concerned.

All children on the same level have the same developmental age. Accordingly, the Grid shows whether the child is advanced or retarded in respect to the general population.

For example, a child who reaches level 100 at 8.35 years of age is said to possess a developmental age of 11.6 years. Similarly, a level of 130 attained at the age of 15.3 years corresponds to a developmental age of 13.7 years. The former child is advanced, the latter retarded in development.

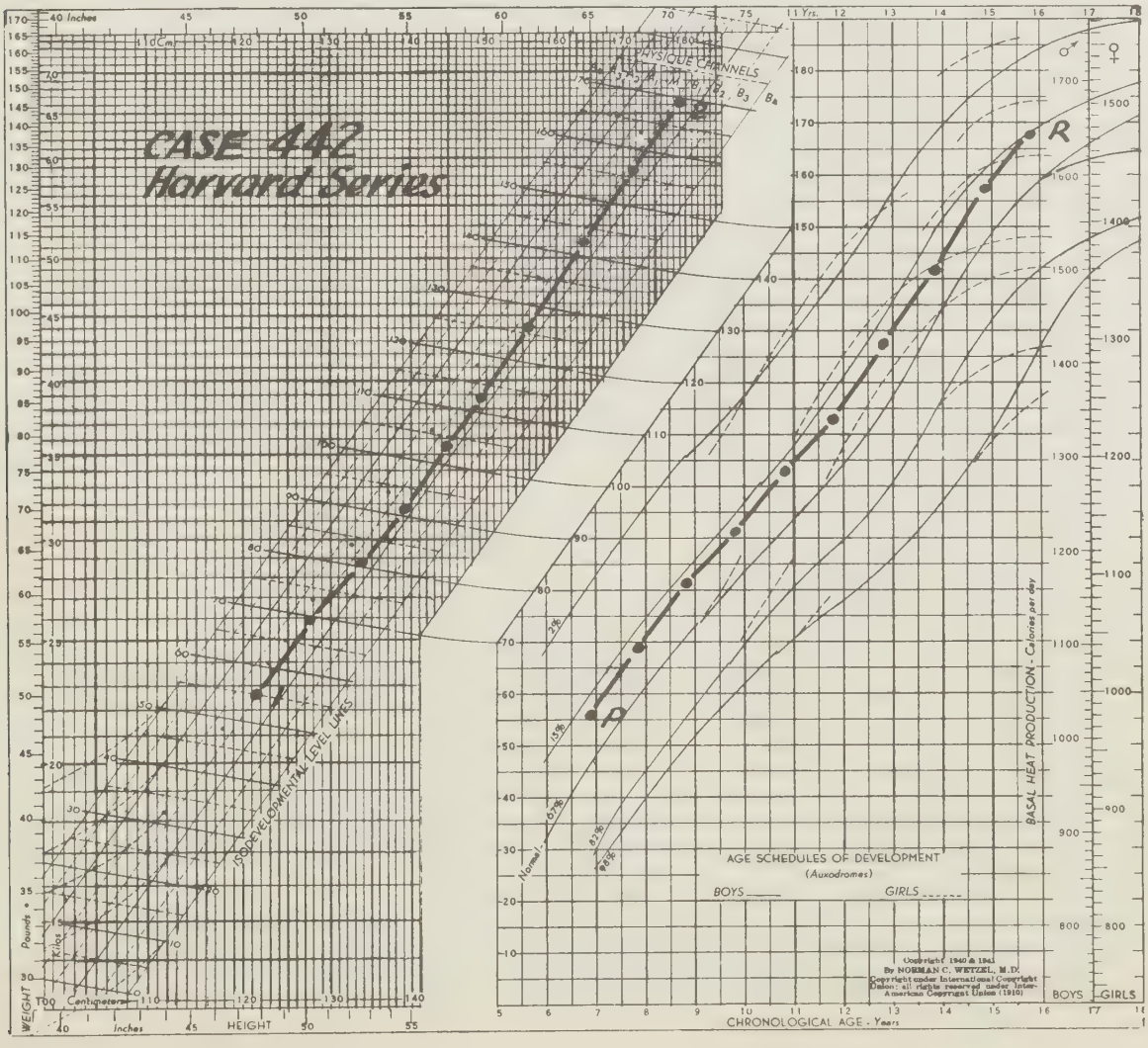
MATURATION

Equal developmental ages do not signify equal maturity - or, to state it differently, developmental age is not an absolute measure of maturity.

When a child's auxodrome is plotted, an approximate indication of his growth in maturity is available since each group of auxodromes has its own characteristic upper limit.

The onset of puberty is usually a perfectly definite and recognizable event, by long experience awaited between the twelfth and sixteenth years, with the average age at onset being close to 13.6 years for both sexes. This estimate was fixed by the age at which the final deceleration of growth in weight had been found to reach its maximum value. Available research indicates that girls who mature early are significantly larger than girls of the same age who mature late. Using the Grid recordings, the rule is that the onset of puberty may be expected in the neighbourhood of the greatest upper curvature of a child's auxodrome. Puberty in boys is similarly to be expected on their own curves. The greatest upper curvature, moreover, occurs at the very age at which the final deceleration of development is maximum. These results suggest that maturation is not directly related to age or to size, but rather to a more fundamental and critical property - namely, maximum deceleration of growth and development and through this, indirectly to age.

Fig.25-FS.27



TOLERANCE LIMITS FOR JUDGING THE QUALITY OF GROWTH

Direction - In top-quality growth and development a child will progress channel-wise with remarkable precision (Fig.25). Owing to many different influences, however, acceptable variations in direction may amount to, but will not consistently exceed, a shift of one-half channel per 100 levels of advancement. Departures greater than this are not due to chance; they are systematic and must be attributed to some assignable cause of trouble that ought to be looked for without undue delay.

Speed - Similarly, in the case of speed, acceptable deviations from schedule will not be more than two to three levels per year, and even these should be compensated early, for, if they are persisted in, they will lead within another year or so to further lag and thus to undesirable degrees of growth failure of the type associated with simple malnutrition.

A healthy child progresses along a certain channel corresponding to his own individual physique, at a rate which also follows a normal pattern, whether it be that of the 2%, 15%, 67%, 82% or 98% of the general population (e in Fig.5). Girls, it is seen, tend to level off earlier than boys.

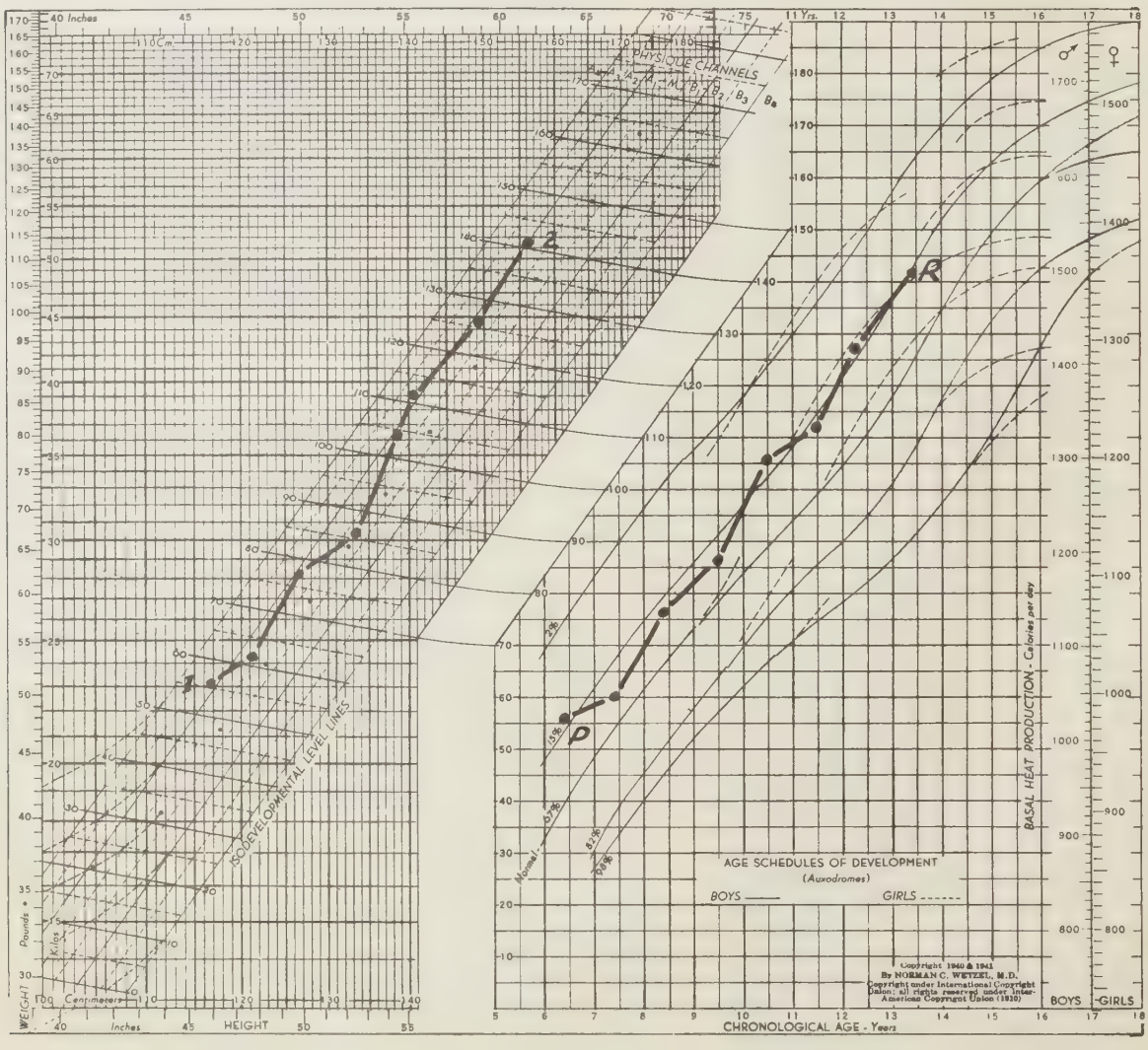


Fig.26-FS.28

This record shows greater variation in direction and speed of development than does the record of Case 442 Harvard series. The quality of growth shown is acceptable but is not top quality.

Such a record is valuable in showing both the child and his parents the need for and value of using acceptable health habits routinely and of scheduling a reasonable amount of time for work, rest and play each day.

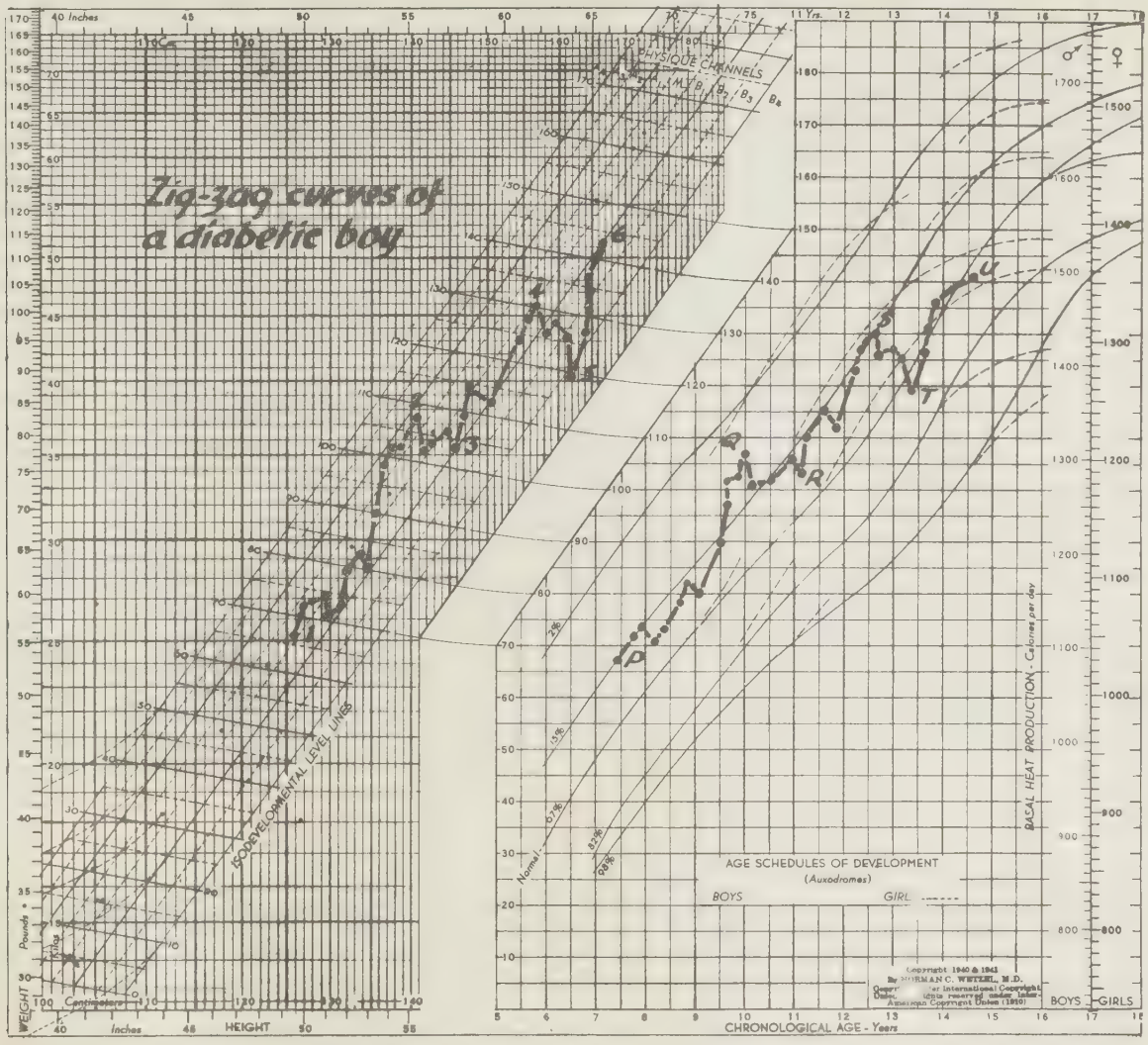


Fig.27-FS.29

This record pictorializes a child's repeated episodes of growth failure occurring throughout his whole developmental course. The instability and irregularity of these curves clearly indicate when and to what extent this child has failed to observe an acceptable living routine required by his diabetic condition.

While this record illustrates a medical problem, it is altogether likely that persons such as teachers, parents, nurses and social workers can use the information it displays in assisting a child to maintain himself at his own optimum progress.

Experience has shown that children who are free from medical problems but who do not observe appropriate health habits may develop growth failure of a similar type.

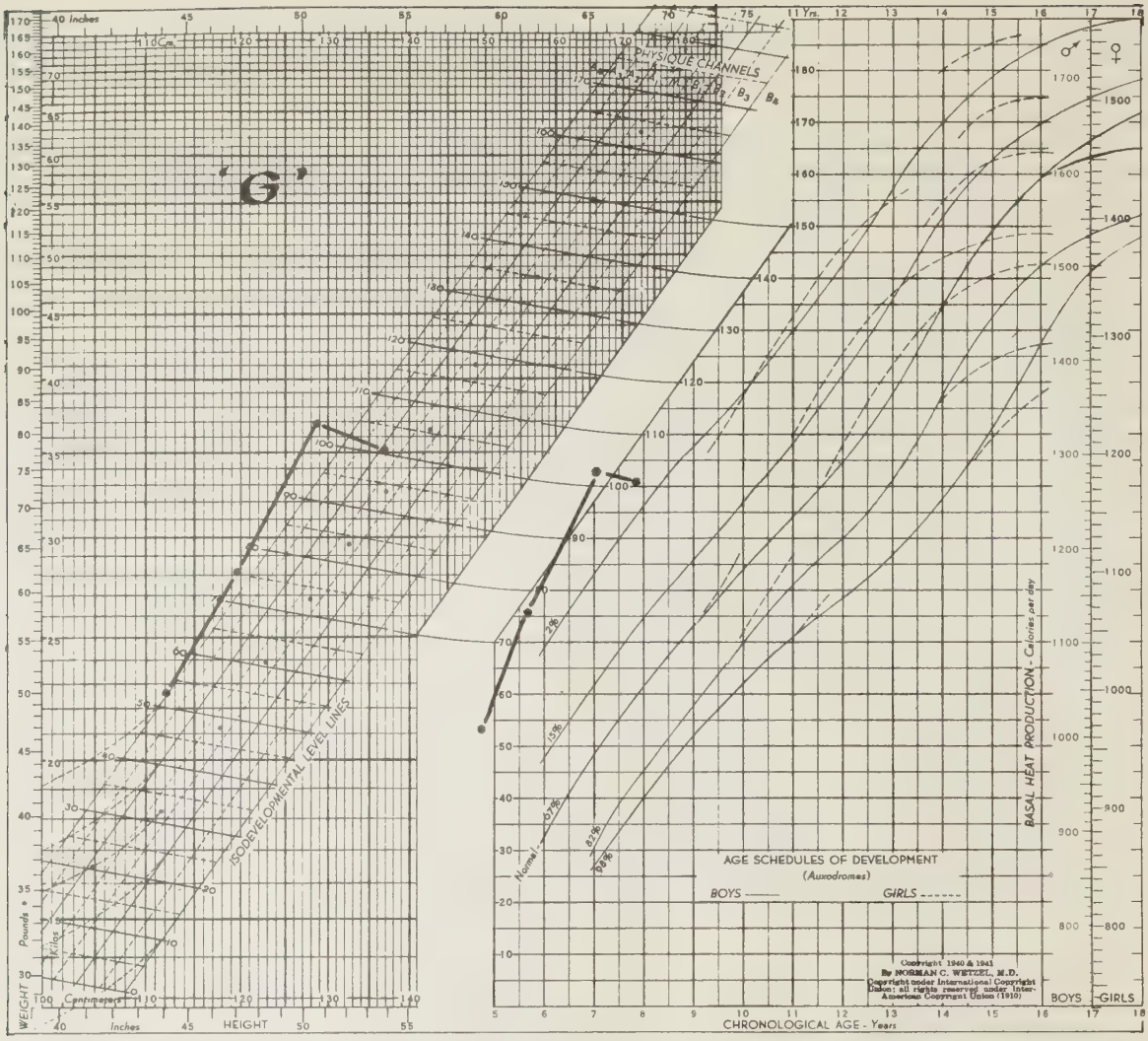


Fig.28-FS.30

Miss E. Nancy Scramlin, School Nurse, Burris School, Muncie, Indiana, has used the Grid in her routine work. Records "G" and "M" have been selected from her school files.

Miss Scramlin reports that "G" was a plump, stocky child who entered kindergarten at the age of five years and nine months. He was definitely not the average type, yet the average scale was the only one usable for him in the weight tables based on height, age and type. On this basis he was 24% overweight by the time he had reached the first grade. A year later the only figures which fitted his age and height were those in the tall, slender scale, which rated him 33% overweight. Disregarding his age and using the tables for stocky types, he rated 20% overweight - or would even do so if he were 10 or 11 years of age.

"These data, when placed on the Grid, give a clearcut picture of the trend of the child's weight and warn at a glance, by the time he has reached first grade, that his rate of gain is excessive. During his second year "G" was found by his doctor to have a low metabolic rate and was placed under medication. In one year his channel rating changed from A_5 to A_1, with a corresponding marked improvement not only in body proportions but in physical skills and scholastic progress."

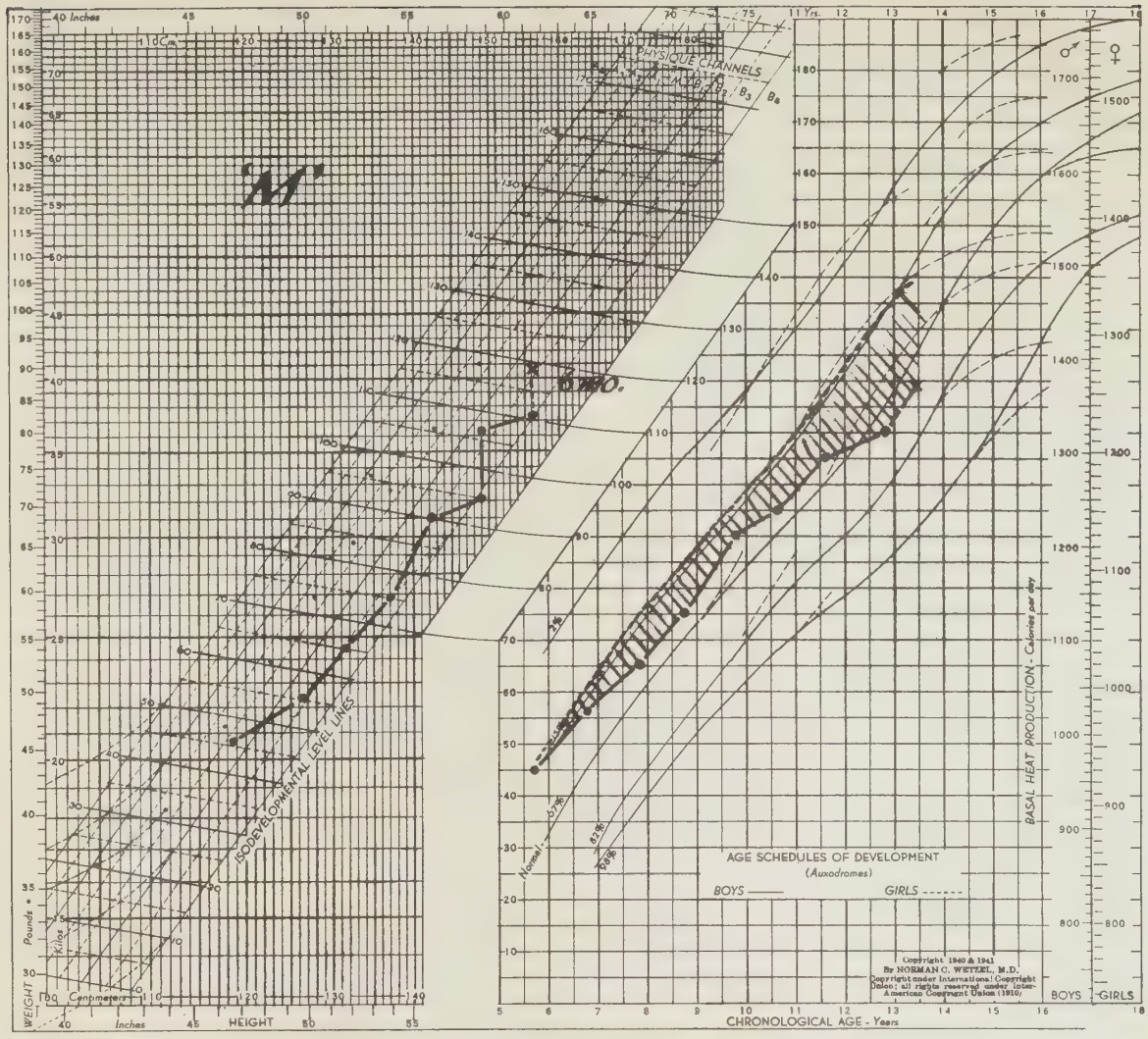


Fig.29-FS.31

"M" represents a boy now 13 years of age - a thin, "high-strung" nail biter. The home had been disrupted by war conditions, and it had been necessary for the mother to assist in the father's business. At 12 years "M" rated 16% underweight, and nine months later it had increased to 23%, as his weight had remained practically stationary as he grew in height. His Grid rating dropped from B_3 to B_5. This boy had begun kindergarten a year advanced physically. By the fall of 1944 he was six months retarded. His developmental progress had been only one-half of that expected in the past year, and in three years he had made only 20 of the 36 points (levels) channel-wise which normally would have been expected of him. The family doctor found no physical defect in this case.

"M", however, is an alert, interested child, and since the Grid was explained to him he has followed it closely. He has worked earnestly to improve his eating and sleeping habits and reports voluntarily every week or ten days for a weight check, now proud that he has progressed eight points (levels) and an entire channel in six months. The broken auxodrome curve indicates the progress which normally would have been expected of "M" had he continued on his original schedule of development. The cross patched area shows how much needs to be made up before recovery can be said to be complete."

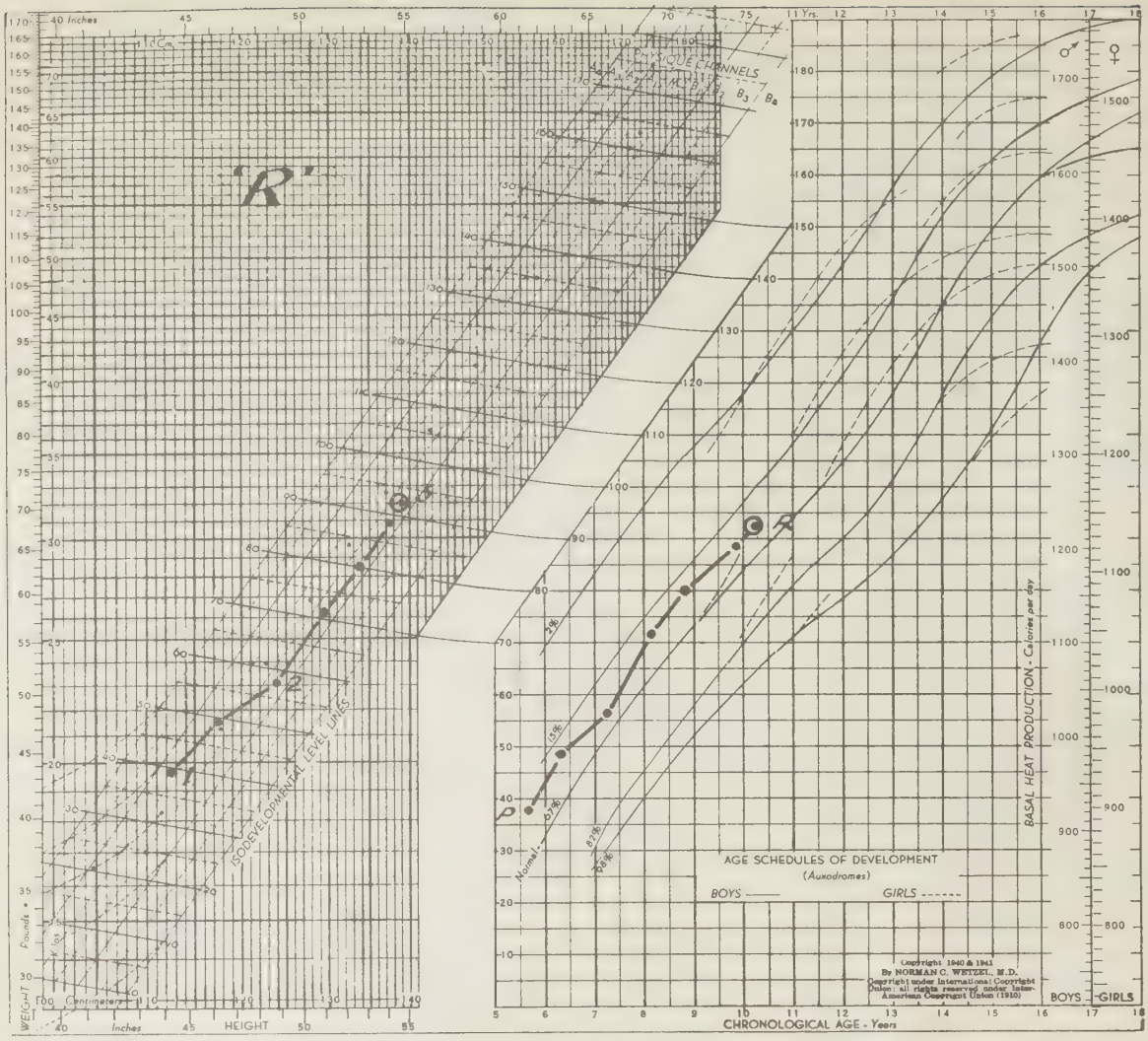


Fig.30-FS.32

Two children, "R" and "T" had the same initial Grid placement, due to identical weights and heights - namely, weight, 70$\frac{3}{4}$ pounds; height, 54$\frac{1}{2}$ inches. Previous school records provided data which assisted in the interpretation of the initial rating.

Data for Grid Record "R" -	Age	Weight	Height
	5-7	43	44
	6-5	47	46
	7-3	50$\frac{1}{2}$ ...	48$\frac{1}{2}$
	8-1	58	51
	8-11 ...	63	52$\frac{1}{2}$
	9-11 ...	68	54
	10-2	70$\frac{3}{4}$ ...	54$\frac{1}{2}$

"R" is passing through point (3) - namely, B_1 - 92 at ten years and one month, whereas "T" (see Fig.31) does so at eleven years and three months. "R" is travelling channel-wise. His expected and his actual auxodromes coincide. It is clear that "R" is developing in accordance with his own schedule.

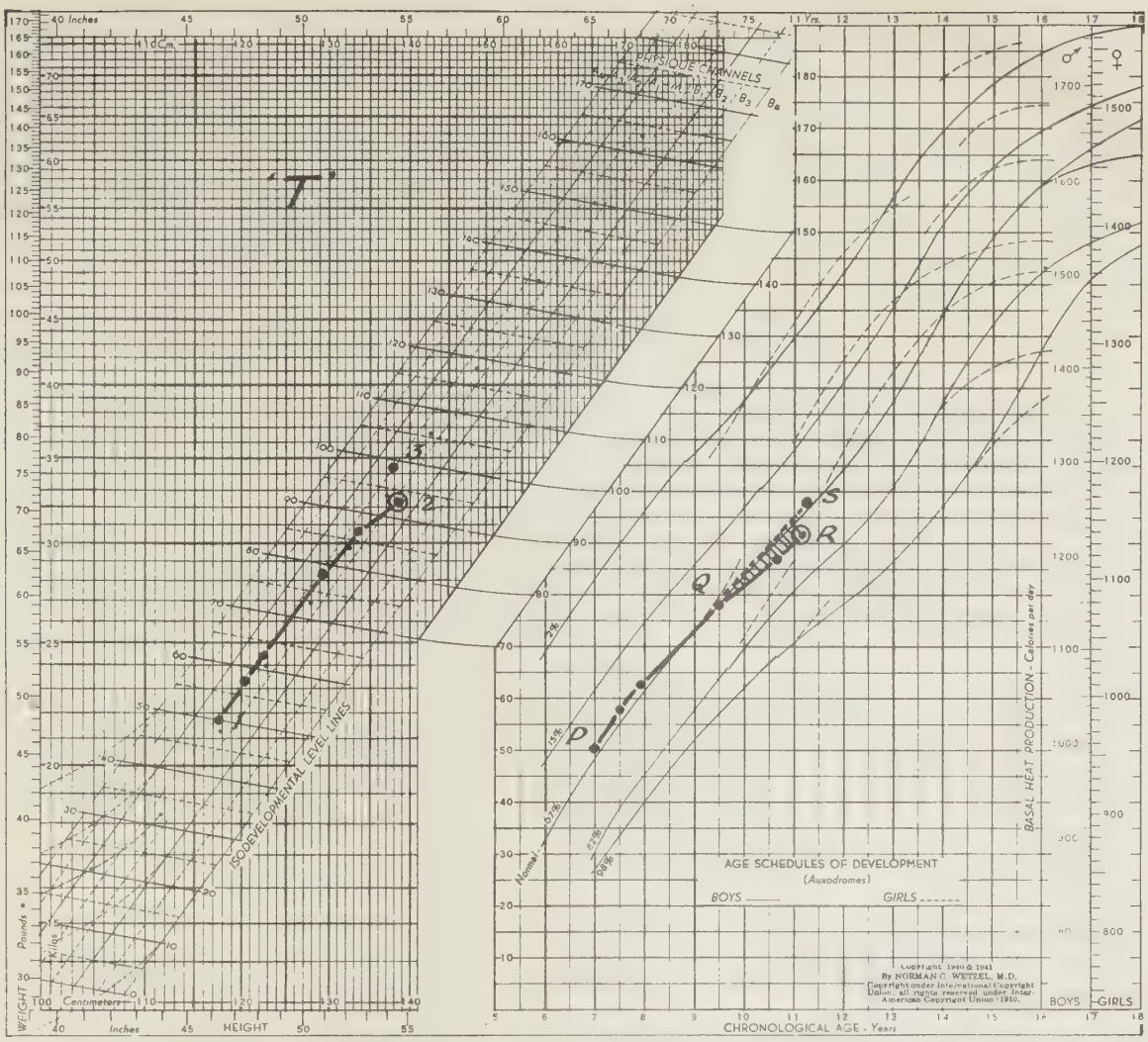


Fig.31-FS.33

Data for Grid Record "T" -

Age	Weight	Height
7-0	48	46¼
7-7	51¼ ...	47¼
8-0	54¼ ...	48¼
9-6	62¼ ...	51
10-9	67¼ ...	52½
11-3	70¾ ...	54½

It is evident from the Grid, but not from the table, that "T"'s growth has been retarded. At 11.25 years the extent of retardation is represented by six levels, which is equivalent to half a year's growth.

The letter "R" on the Grid indicates the actual position the boy has reached at the time of observation. The letter "S" on the Grid indicates the expected position which the boy would have reached at 11.25 years had his growth been consistent with his own pattern as evidenced by earlier recordings.

Attention is drawn to the fact that these Grid records summarize in visual form the present physical condition of each boy in terms of the boy's own progress and thus lay the foundation for individualized evaluation and action.

It is extremely doubtful if the results clearly shown on the Grid recordings could have been visualized by a consideration of the same data in tabular form. One cannot "see" (in a tabulation of ages, weights and heights) present physical status and its relationship to growth. However, by examining the Grid recordings it is evident that although "R" required no particular attention, "T" was progressing unfavourably and would eventually experience considerable growth failure unless measures were taken to rehabilitate him.

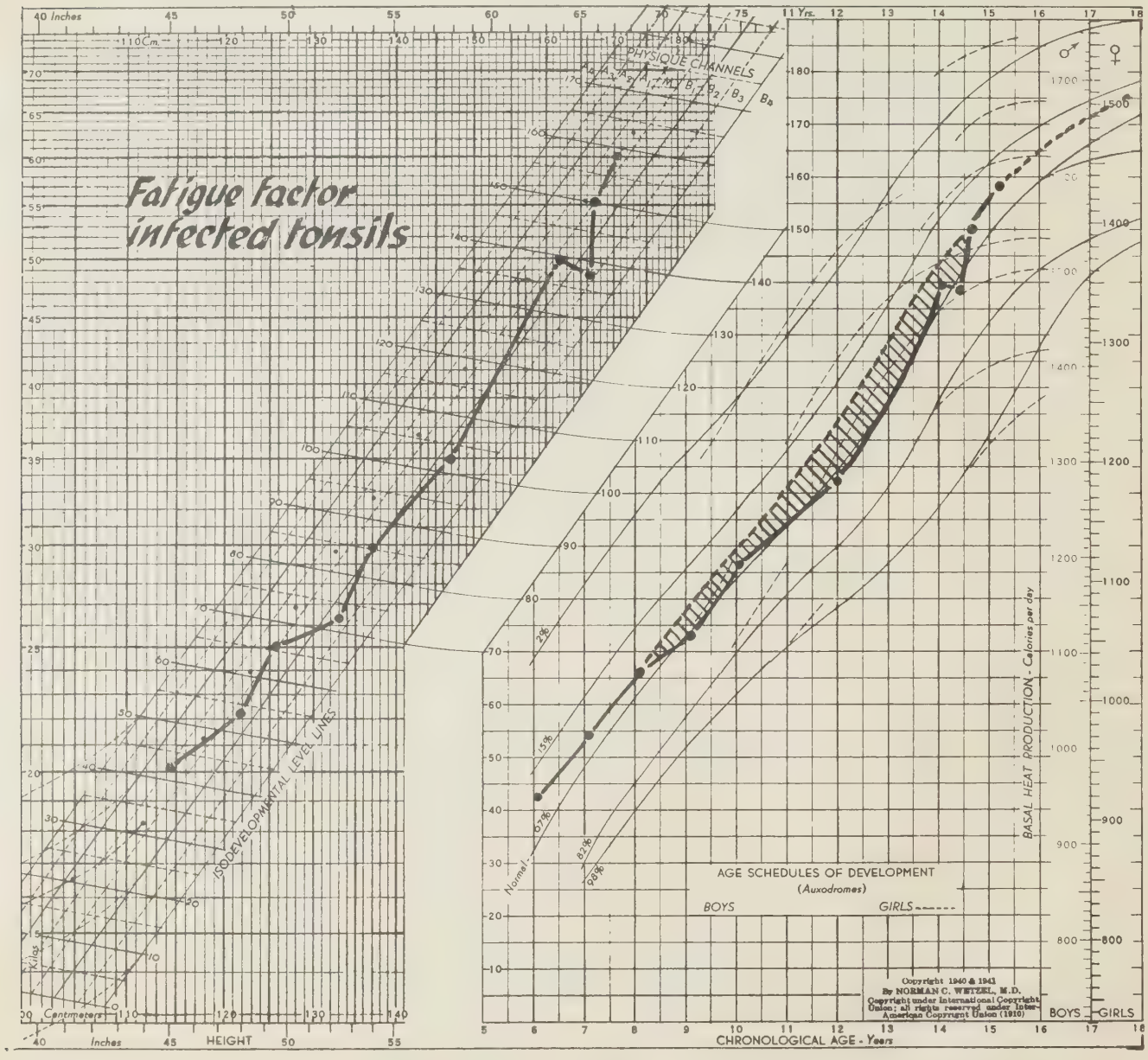


Fig.32-FS.34

D.H. shows beginning growth failure (red area lag) starting at eight years and two months. Emotional tension due to fatigue and, latterly, diseased tonsils led to this abnormality in growth and development. Following a recovery program, there is return to physique type and normal auxodrome.

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